THE FARMERS' REGISTER.

VOL. II. MARCH, 1835. No. 10.

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Extracts from the last edition of the "Complete Grazier."

ON THE ECONOMY AND MANAGEMENT OF THE DAIRY.

Of the situation and buildings proper for a dairy.—Dairy utensils.

[Continued from page 558, Vol. II.]

A dairy ought, if possible, so to be arranged, that its lattices may never front the south, south-west, south-east, or west;—a northern aspect is the best; but there should be openings on two sides of the building—the north and east, if possible—in order to admit a free current of air. These lattices, which are in every respect superior to glazed lights, may be covered in summer, with gauze wire, or with oiled paper, pasted on packthread stretched for that purpose, so as to admit the light, whenever it may be necessary to exclude the cold or wind.*

The *situation*, for the sake of convenience, should be near the cow-house, as well as the farm-house; but care should at the same time be taken, that it be so far removed as not to be exposed to the effluvia of the cow-house, stables, or farm-yard; as any bad scent might taint the milk, and give an unpleasant flavor to the butter. It frequently happens that the dairy adjoins the cow-house; but in that case, at least no communication should be left between them.

In its *construction*, as it is of material importance that the heat be of one uniform temperature, of from fifty to fifty-five degrees of Fahrenheit's thermometer, double walls and a roof have been recommended, leaving a space of one or two feet, or more, between the wall and the lath and plaster. Mr. Marshall, to whose practical skill our pages bear ample testimony, advises the walls to be constructed six feet thick, one foot on the inside to be of brick or stone, the outside to be of sod, and the intermediate space to be closely filled with earth. The roof, which should be of thatch, should be at least three feet thick, and should project completely over the walls on each side; and as all these materials are non-conductors of heat, he is of opinion, that a dairy thus built, would, if provided with double doors, preserve the degree of heat above mentioned, throughout the year. If sunk a few feet below the surface of the earth, an equal temperature would be still further ensured; but then it should be strictly ascertained that the ground is perfectly free from damp: dryness and ventilation being the most important objects in its construction. The dairy should be neatly paved with stone, or, if this cannot be procured, with red bricks, laid on a gentle descent, and the joinings should be well cemented together, lest any water should stagnate. It will likewise be proper daily to wash the pavement during summer; but great care should be taken to dry it immediately, as damp promotes the putrefaction, or turning, of milk; and as dairy-houses cannot be kept too cool at that season, it will be of great advantage to build them, if possible, near a cold spring or rivulet.

If a small current could be conducted through the premises, or water were, by means of a pipe, so introduced as to fall from some height on the pavement, and run off in a constant stream, without stagnating, it will be of great advantage, as it will contribute much to preserve the air continually pure, fresh, and cool. But as the milk itself, when brought in warm, will naturally tend to raise the temperature of the milk-room too high, it is recommended to have an ice-house attached to the dairy, especially where the advantage of a current of water cannot be obtained. This should be surrounded with double walls, with an interval between them like the dairy. The place for holding the ice should be formed of upright posts, lined with wattled work of wands or close rail work, leaving a path all round, of two feet and a half in width; and round this is to be formed a gutter to carry off the water dropping from the ice. This mode of constructing an ice-house, is not only the cheapest, but also far preferable to the common practice of making cellars under ground, which are both more expensive, as well as liable to mould and rottenness. The structure of such an ice-house, attached to a dairy, would prove much less expensive than is commonly imagined; and by its utility in that, and other respects, would amply compensate the cost.

In winter, on the contrary, it is equally important that the requisite degree of heat should be constantly maintained. If the building, as commonly is the case, form part of the house, it will generally be found sufficiently warm without the addition of artificial heat; but, in very cold weather, in detached dairies, unless they are constructed as already described, it is difficult to preserve the proper temperature without the aid of a stove. The expense is of no consideration, when put in comparison with the advantage; but great attention is required in its management, for if too much warmth be admitted, it will be as injurious as too little, and it will be useless if neglected during the night, for if the dairy be allowed to become too cold, the injury done to the milk cannot be repaired by afterwards warming it.

As the greatest cleanliness is requisite in the various departments of the dairy, a well-arranged building should have separate apartments in order to perform its business properly. A *butter dairy* ought to comprise three; one for receiving the milk, another for performing the operation of churning, and a third for containing and cleaning the various utensils. For *a cheese dairy*, four rooms will be requisite, viz. a milk-room, as before, another for making and pressing the cheese, a third for salting it, and a fourth (which may be commodiously placed as a loft over the others) for storing and preserving them until brought to market. The receiving-room, however, should not communicate with the others by interior doors or windows, for the milk would be injured by the heat and steam arising from them; and an open shed, formed by the projecting roof of the building, will generally be found sufficient for scouring

*Lattices in dairies are exempted from the tax on windows, but *not* glazed lights.

and drying the vessels. The churning-room should be provided with a boiler, of dimensions suited to the number of cows employed, for warming water, milk, and whey; and must contain sufficient space for conveniently performing all the operations of the dairy, whether it be devoted to the manufacture of butter or cheese. Where a dairy is confined to the sale of milk, two apartments will suffice, one for containing the milk as it is brought in, and another for serving it out, scalding, and keeping the utensils. As these, however, are rarely to be found in the common dairies, it will be the more necessary to pay the strictest attention to order and neatness in those which do not possess so many conveniences. Should the temperature of the milk-room become affected by the carrying of newly-drawn milk into it, it may easily be reduced to the proper degree, by suspending a small quantity of ice at a considerable height from the floor; and if, during winter, the cold should become too great, and that it is not provided with a stove, a barrel of hot water closely stopped, or a few hot bricks, placed on the floor or table of the milk-room, will readily counteract its effects. But on no account whatever should a chafing dish with burning coals be used, as it will certainly impart a bad taste to the milk.

The utensils of a dairy comprise pails, sieves, coolers, churns, creaming-dishes, cheese-vats, ladders, and presses; all of which are so familiar to every dairy-woman that it would be only waste of time to describe them. To these should be added a Fahrenheit's thermometer, which should be suspended in a central part of the milk-house. Wood is the material usually employed, and, with requisite care, nothing can be more sweet or proper; but they require the closest attention in scouring and scalding every time they have been used, as the smallest drop of milk left in them, or the least taint of acidity or mustiness, will infallibly spoil the next milking. Wherever the size and shape of the utensils will admit, earthenware vessels, properly glazed, will therefore be found less troublesome: but lead, copper, or brass utensils, as well as earthenware vessels glazed with lead, ought on no pretext whatever to be used; for the acid which is contained in milk that has been long exposed to the air, combines with these metals, and forms a poisonous compound with them, which, though perhaps not absolutely deleterious in any serious degree, has yet been found to impart a disagreeable flavor to the milk. Cast-iron, though it does not form a poisonous compound with the milk, is by no means unexceptionable, because it does form a compound that may, in a considerable degree, affect or change the taste and quality of dairy products. Of all metallic dishes, those invented a few years since by Mr. Baird, of Shott's ironworks in Linlithgowshire, are perhaps liable to the fewest objections, as the tin with which they are coated is acted upon by the acid of milk in a very slight degree. These vessels are made of cast-iron softened by annealing in charcoal, so that they will not break by an ordinary fall, turned smooth in the inside, and laid over with a coat of tin to prevent the iron from coming in contact with the milk. These milk dishes are coming into very general use; and their invention is one of the greatest improvements in dairy management. They are kept more easily clean than wooden vessels: and their superior power of conducting heat cools the milk so rapidly, that the Scottish farmers' wives, who have given them a fair trial, affirm, that they throw up one third more cream from an equal quantity of milk. It has been lately found that slate makes very good milk coolers, and in some of the midland counties the common flag slate is employed for the purpose.

All dairy utensils ought to be most carefully scoured, first with hot water, and afterwards rinsed, with cold, and kept in an airy place, in order that every possible degree of acidity may be removed. Should one or two scourings be insufficient, they must be repeatedly cleansed until they become entirely sweet, as the slightest taint or acidity may cause material loss.

The churn in most common use is that denominated the *plunge-churn*, the structure of which is too well known to require any description. It is made of any size, from ten gallons to near a hundred, when worked by hand; but in large dairies, where the system of churning from the whole milk is adopted, it is frequently wrought by horse-power, and is then much larger. The tedious manner in which it operates, has occasioned the invention of many others, among which the *barrel-churn* has been most generally adopted, in consequence of the superior ease with which it is worked; there is, however, a prejudice against it in many dairies, where it is supposed that it does not extract the butter so well as by the old, though more laborious method; but the contrary is asserted by its advocates.*

Of the management of milk and cream, and the making and preservation of butter.

The quality of cows' milk greatly depends on the nature of their food, which likewise materially affects the quantity they will yield; though this last circumstance is, in some measure, regulated by the manner of milking them. It will, therefore, be necessary to be very cautious in choosing milkers, because, if a cow be roughly handled, it is not only painful to her, but will also cause her to withhold her milk, whereas, if it be gently drawn, she will yield it freely; and it is of importance that it be drawn to the last drop, for it will otherwise decrease at each succeeding meal. As it sometimes happens that cows are *ticklish*, they should, on such occasions, by no means be harshly or severely treated; and if the udder be hard and painful, it ought to be fomented tenderly with luke-warm water, and stroked gently, by which simple expedient she will be brought into good temper, and yield her milk with pleasure and freedom. It is also proper to feed the cows at the time of milking, for, while eating, they give out

* We omit here the description of two improvements on churns, because of the want of the necessary explanatory cuts, which would be more costly and inconvenient than the object would be worth. It is enough to state that the churns supposed by the author to be best, and therefore selected for particular description, are 1st, one of our own country, manufactured by Messrs. Wright and Co. of Philadelphia, and 2nd, Mr. W. Bowler's churn, for which was awarded a premium by the Society for the Encouragement of Arts.—Ed. Far. Reg.

their milk with greater freedom, and they are prevented by the motion of their jaws, from the common, and very pernicious trick of withholding their milk; by which, if not promptly prevented, they will soon become dry.

In this country, it is the general practice to milk cows twice in the course of twenty-four hours, throughout the year; but, in summer, the proper periods are at least three every day, and at intervals as nearly equidistant as possible, viz. very early in the morning, at noon, and a little before the approach of night. For it is said to be a fact, confirmed by the experience of those who have tried it, that cows, when milked thrice in the day, will yield more milk in point of quantity, and of as good, if not better, quality, than they will under the common mode of milking only on the morning and evening.

After the milk is drawn from the cow, it should be carefully strained through a gauze or linen cloth, stretched on an open bottomed wooden bowl, or a hair-sieve, or through a sieve made of silver wires, on account of its superior wholesomeness, into the cream-dishes, which should never exceed three inches in depth, though they may be made so wide as to contain any quantity required, and which ought to be perfectly clean, sweet, and cool. If any ill flavor is apprehended from the cows having eaten turnips, &c, the addition of one-eighth part of boiling water to the milk, before it is poured into the dishes, will, in a great degree, remove it; and, when filled, the dishes ought to be set upon shelves, or dressers, there to continue till the cream is removed.* It should also be observed that:—

I. The milk first drawn from a cow is always thinner, and inferior in quality to that afterwards obtained; and this richness increases progressively to the very last drop that can be drawn from the udder.

II. The portion of cream rising first to the surface, is richer in point of quality, and greater in quantity, than that which rises in the second equal space of time, and so of the rest; the cream continually decreasing, and growing worse than the preceding.

III. Thick milk produces a smaller proportion of cream than that which is thinner, though the cream of the former is of a richer quality. If thick milk, therefore, be diluted with water, it will afford more cream than it would have yielded in its pure state, though its quality will at the same time be inferior.

IV. Milk carried about in pails, or other vessels, agitated and partly cooled before it be poured into the milk-pans, never throws up such good and plentiful cream as if it had been put into proper vessels immediately after it came from the cow.

From these fundamental facts, some important inferences, serving to direct the practice, may be deduced, among which we can only notice the following:—

1. It is evidently of much importance, that the cows should be always milked as near the dairy as possible, to prevent the necessity of carrying and cooling the milk before it be put into the dishes; and as cows are much hurt by far driving, it must be a great advantage in a dairy-farm, where the practice of house-feeding is not adopted, to have the principal grass fields as near the dairy homesteads as possible.

2. The practice of putting the milk of all the cows of a large dairy into one vessel, as it is milked, there to remain till the whole milking be finished, before any part is put into the milk-pans, seems to be highly injudicious, not only on account of the loss sustained by the agitation and cooling; but also because it prevents the owner of the dairy from distinguishing the good from the bad cow's milk, so as to enlighten his judgement respecting the profit that he may derive from each. A better practice, therefore, would be, to have the milk drawn from each cow separately, put into the creaming-pans as soon as milked, without being ever mixed with any other; and if these pans were labelled with the cow's name, the careful *dai** would thus be enabled to remark, without any trouble, the quantity of milk afforded by each cow every day, as well as the peculiar qualities of the milk.

A small quantity of clear water, cold in summer, and warm in winter, put into the bottom of the milk-pan, will be found to assist the rising of the cream; but it is thought by some persons to be prejudicial to the butter.

3. If it be intended to make butter of a *very fine quality*, it will be advisable, not only to reject entirely the milk of all those cows which yield cream of a bad quality, but also, in every case, to keep the milk that is first drawn from the cow, at each milking, entirely separate from that which is got last; as it is obvious, that, if this be not done, the quality of the butter must be greatly debased, without much augmenting its quantity. It is also obvious, that the quality of the butter will be improved in proportion to the smallness of the quantity of the last-drawn milk which is used, as it increases in richness to the very last drop that can be obtained from the udder at that time; so that those who wish to be singularly nice, will do well to keep for their best butter a proportion only of the *last-drawn milk;* in like manner of the *first-drawn cream*.

It is a matter of some importance, to determine in what way the inferior milk, thus set apart when *fine butter* is wanted, can be employed with the greatest profit. In the Highlands of Scotland, the people have adopted a practice which answers many good purposes. As the rearing of calves is there a principal object with the farmer, every cow is allowed to suckle her calf with a portion of her milk, the remainder only being employed for the purposes of the dairy. To give the calf the proportion allotted to it regularly, it is separated from the cow, and put into a small enclosure made

* Mr. Young has recommended the dairy-man to boil two ounces of nitre in one quart of water, and to bottle the mixture; of which, when cold, a large tea-cup full is to be added to ten or twelve quarts of milk as soon as it comes from the cow: the quantity of saltpetre is to be increased as the turnips become stronger. The feeding of cows with the roots alone will, as the Earl of Egremont found, prevent the milk from having a bad taste. Another method of removing any ill flavor, arising from the cows having eaten turnips, consists in warming the cream, and afterwards pouring it into a vessel of cold water; from which the cream is to be skimmed as it rises to the surface, and thus the unpleasant taste will be left behind in the water.

* A provincial word, denoting the person who has the chief concern in a dairy.

for the express purpose, on every farm, of confining the calves. At regular times, the cows are brought to the door of this enclosure, where the young ones fail not to meet them. Each calf is then separately led out, and runs directly to its mother, where it is allowed to suck till the dairy-maid judges that it has had enough; it is then separated, the legs of the mother having been previously shackled, by a very simple contrivance, to oblige her to stand still, and the dairy-maid milks off what was left by the calf. They proceed in this manner till the whole of the cows are milked, and thus do they obtain a small quantity of milk, it is true, but that of an exceedingly rich quality; which, in the hands of such as know how to manage it, is manufactured into the richest marrowy butter that can be anywhere met with. This richness of the Highland butter has been long remarked, and has been universally ascribed to the old grass that the cows feed upon in those remote glens; but it is in fact chiefly to be attributed to the practice here described, which has long prevailed in those districts.

Milk consists of three component parts, blended into one, and distinguished as *butyraceous*, or oily substance, of which butter is composed; *caseous* matter, from which cheese is formed; and *serum*, or whey. To separate these is the chief object of the dairy; and, with regard to butter, two different modes have been adopted: the one, from the *cream alone:* the other, from the *milk and cream united.* The former operation is thus performed.

The milk is carefully skimmed by means of a skimming dish, (if possible without spilling any upon the floor, because it will speedily taint the air of the room,) and the cream poured into a vessel, till enough be obtained for churning. When the cream has been collected, it should be put into a deep covered vessel, for the action of the air on the surface dries it; and it should be well stirred with a stick or spoon, once or twice a day, until made into butter. The time of keeping depends on the weather: if the cream from each milking be kept separately, it may remain a week, in most seasons, without being injured; but if sweet cream be mixed with that which is sour, they ferment and soon become putrid. This is partly prevented by the stirring: but it is far better to keep the cream from every milking apart, and thus allow each to become sour of itself, and the contrary practice should never be adopted, unless it be intended to churn the moment the whole mass has become acid.

In different counties there are several variations in the making of this primary article of domestic consumption; and among these, the following is the method of preparing it, which is peculiar to the counties of Somerset, Cornwall, and Devon—where it is termed *clotted*, or *clouted cream.* The milk, when twenty-four hours from the cow, is put into a kettle over a slow fire, which should be hot enough to bring it *very near* to the boiling point in about *two hours*, and not less. A person (usually a child) is set to watch it; and, the moment a bubble rises to the top, formed by the vaporized milk, the whole is taken off, and set to rest for twenty-four hours more. At the end of this time, if the quantity of milk be considerable, the cream will be an inch or more thick upon the surface. It is now divided with a knife into squares of a convenient size, and removed. The milk, remaining after the cream is taken off, contains little beside the watery particles in its original composition. The dairy-women, in the above mentioned counties, say that milk, thus treated, will yield one-fourth more cream than is produced in the common way, and that a few strokes of the churn will form such cream into excellent butter. At present this cream is chiefly confined to the breakfast table; it is excellent for use with coffee, but when put into tea, it injures its taste, by being instantly converted partially into butter which rises to the surface: when prepared as above, it will keep somewhat longer than common cream.

In the neighborhood of *Epping*, which has long been famous for the quality of its butter, the following is the common process:—the milk, after standing twenty-four hours, is *fleeted*, or skimmed, and the skimmed milk is drawn off into vessels of an increased depth, which is called doubling. There it remains for twelve or twenty-four hours more, as the weather permits, during which time, as the cream rises, it is fleeted two or three times. It is then trebled, or put into deep tubs, where it is again occasionally skimmed, and kept so long as any appearance of cream is found to form on the surface. The butter made from these after-fleetings is, however, of a paler color and inferior quality to that made from the first cream; it is, therefore, usually churned apart. In making the first quality, when the butter is come, the dairy-woman throws it first into clear water, and then upon a board, and with her hand squeezes out all the water; sprinkling, at the same time, a little salt over the whole mass, which is then divided into pounds, and they, as they are weighed, are again squeezed and rolled out to the length of about fourteen inches. So far, the method nearly accords with that in most other districts; but there is this peculiarity in the management of the Epping dairy-women, that they consider a small proportion of acid, either natural or artificial, necessary to ensure a good churning; for which purpose they either mix sour cream with the sweet, or they employ lemon juice, and sometimes rennet. The practice merits attention on dairy farms which possess pasture of a short and sweet nature; but where the herbage is coarse, or the cows are fed on roots, or other succulent artificial food, the fresher the cream is churned, the better will be the butter.

With respect to the *operation of churning*, we would particularly remark, that it ought to be regularly continued, till the butter is *come*, or formed; for, if the motion be, in summer, too quick, the butter will, in consequence, ferment and become ill-tasted; and, in winter, it will *go back*. In hot weather, the business of churning may be much facilitated, by immersing the pump-churn (if such be employed) about one foot deep into a vessel of cold water, and continuing it there till the butter is made. Where other churns are made use of, the addition of one or two table-spoonsful of distilled vinegar, after the cream has been considerably agitated, will, it is said, produce butter in the course of an hour. It should, however, be observed, that the temperature of the milk should always be maintained at from 70 to 75 degrees of Fahrenheit's thermometer; and, therefore, in cold weather, it is sometimes necessary to add as much warm water as will raise it to that height. This

should be done, too, immediately after the lapper has been broken in the churn; and it should be poured in gradually by one person, while another is churning; for if poured in either too suddenly, or too hot, it will wet a portion of the butyraceous substance. It should also be observed, that when the milk has been either too much heated or too quickly churned, it becomes soft and of a pale color. From two to three hours is the usual time required for churning milk, but this depends on various circumstances of quantity, quality, and season; much less is requisite for cream, and least of all for that which is clouted.

After the butter is formed, the usual practice is to *wash it* in several waters till all the milk is removed; but care should be taken not to knead or beat it immediately, as it would be thus rendered tough, and the less it is handled, after being once made, the better. Some advise the milk to be forced out of the cavities of the butter by means of a flat, wooden ladle, furnished with a short handle; but, although the beating of butter up by the hand is an indelicate practice, it is yet so established in all dairies, and so much the most easy and effectual, that any attempt to abolish it may be considered hopeless. As it is hurtful to the quality of the butter to pour much cold water on it during this operation, the butter, if too soft to receive the impression of the mould, may be put into small vessels, and these be permitted to float in a trough of cold water beneath the table, *without wetting the butter*, which will soon become sufficiently firm. Or, when butter is first made, after as much of the milk has been got out as possible, it may be thinly spread on a marble slab, and the remaining moisture be absorbed by patting it with clean dry towels.

On the *making up of butter*, and particularly on the admission of water, whether warm or cold, into the churn, the following pertinent observations occur, in the Agricultural Survey of Sussex, on the dairy system of that county:—"Water is well known to be a great dissolvent; at least, if it be not essentially so, it serves as a conducter to air, which is universally such. Fresh butter then, in consequence of imbibing water, and water being saturated with air, is always in a progressive state of decay. Not so when water is excluded; its oleaginous parts are admirably calculated to secure it from putrefaction: and it is not improbable that butter might be made with as little trouble as the present method, to keep the whole year fresh and sweet, with the least particle of salt, solely by the exclusion of water. In order to effect this, the floor of the dairy should be kept perfectly dry, for water thrown down in hot weather will assuredly rise again in steam, and affect the milk with its humidity. The vessels used for holding the milk, the churn, and all the dairy utensils, after being first washed clean, should then be rinsed a first and second time with sweet milk—a cruet, washed ever so clean with water, will cause vinegar to become dreggy; but if rinsed with a little of the same, will always appear limpid and clear. No water to be put in with the cream when it is churned. The butter, as it is taken out, to be put into a tray, full of holes, and placed over any other vessel; but not to be squeezed into lumps, as it will drain the better for being loose in its texture. It should then (after having well drained) be removed to a tray without holes, and be kneaded with the hands (first rinsed in whey) and formed into a thin flat cake, slightly sprinkled with salt, and left in that state for about half an hour; by which time the salt will have extracted the whey, and it may be made up in the usual manner."

Butter, thus freed from the remaining milk, is called *fresh butter;* and, when sold on the spot or in neighboring markets, it is formed into rolls weighing half a pound or a pound, or into lumps of 24 ounces, termed *dishes* in Somersetshire and some other parts of England. But where it is intended to be kept, or sent to a distance, it is salted by the process immediately to be described, and is put into casks, which contain respectively 28, 56, or 84 lbs., and usually denominated half firkins, firkins, and tubs. Previously to putting the butter into these vessels, especial care must be taken that they be well seasoned by frequent washing and exposure to the air for two or three weeks. As it is very difficult to season new firkins, it will always be preferable to employ those which have been already used, where they can be returned to the dairy owner. The most speedy method of seasoning firkins is, by the use of unslaked lime, or a large quantity of salt and water well boiled; with which they should be repeatedly scrubbed, and afterwards thrown into cold water, to remain there three or four days till wanted. They should then be scrubbed as before, and well rinsed with cold water; and, before the butter is put in, every part of the inside of the firkin must be well rubbed with salt.

The ordinary process of *salting butter*, after the milk has been forced out of it in the manner already described, is, to work into the butter one or two ounces of salt, so thoroughly that it shall be equally incorporated with the mass; for if it be not equally mixed in every part, the butter acquires two colors, becoming yellow where the salt has fallen, and white where it has not, or in some places is termed "pyety" or "pinsowed." The salt employed for this purpose should be of the purest kind, well dried and broken down, but not completely pulverized. Dr. Anderson, however, recommends the following preparation, which he has experienced to be much superior, as it not only prevents the butter from becoming in any degree tainted or rancid, but also improves its look or appearance, while it imparts a sweeter or richer taste than could have been effected by the use of common salt only.

Let two parts of the best common salt, sugar and saltpetre of each one part, be completely blended together by beating, and add one ounce of this mixture to every pound of butter; incorporate it thoroughly in the mass, and close it up for use.

It will be necessary, however, to keep butter, thus prepared, for two or three weeks before it is used, otherwise it will not taste well; but, if properly cured, according to the hints above given, Dr. Anderson states, that it will continue so perfectly sweet for three years, as not to be distinguished from newly-made and salted butter. In Holland, it is said, that the salt for butter that is intended to be kept, is mixed with the milk before it is churned, by which means both its flavor and conservative qualities are more effectually imparted. We cannot vouch either for the practice or its effects; but it certainly is worth a trial.

The best butter is that made during the sum-

mer; but, by adding a certain portion (which experience only can determine) of the juice expressed from the pulp of carrots, to the cream previously to churning, winter-made butter will acquire the appearance and flavor of butter that has been churned during the prime part of the summer season.

When butter is to be exposed to the heat of a warm climate, it should be purified by melting, before it be salted and packed up. For this purpose, Dr. Anderson directs it to be put into a close vessel, and this into another containing water, which must be gradually heated until the butter be thoroughly melted. In this state it must continue for some time, when the impure parts will subside, and leave at the top a perfectly pure transparent oil; which, on cooling, will become opaque, and assume a color nearly resembling that of the original butter, except that it will be a little paler, and of a firmer consistence. This refined butter is then to be separated from the dregs, salted, and put up in the same way as the other butter: it will continue much longer sweet in hot climates, as it retains the salt better. Butter may also be preserved sweet without salt, by adding a certain quantity of fine honey, in the proportion of one ounce of the latter to a pound of butter, and mixing them thoroughly, so that they may be perfectly incorporated. A mixture of this sort has a sweet pleasant taste, and will keep for years without becoming rancid.

The process of making butter from the *milk and cream together*, which is much practised in Scotland and Ireland, is usually as follows:

The milk is placed in pans, from three to six inches deep, and left, from twelve to twenty-four hours; until it has cooled, and the cream has risen to the surface. It is then emptied (before it has become sour) into a well-scalded vat, sufficiently large to contain the whole of that milking; or of two milkings, if both are equally cool and sweet; but if there be the least approach to acidity in either, they are kept separate. The whole of the milk is then left until it becomes thick and sour before it is churned; but it is allowed to become so of itself and is not forced by the mixture of sour with sweet. Care is also taken not to break the coagulum, or *lapper*, as it is technically called, until it is churned: and it is found that the milk may thus be safely kept, from a day to a week, until sufficient is collected to form a churning. With due attention to these points, the butter produced is always high-flavored, and the butter-milk that remains, though acid, is pleasant and nutritive, and, if kept cool, will retain those qualities for a considerable time uninjured; but if, on the contrary, sour milk be mixed with sweet, or the lapper be broken before churning, fermentation will be excited; the milk runs into curds and whey; the butter acquires a bad taste and smell, as well as an ill color; and the butter-milk loses its most valuable properties.*

Such is the practice in the best Scotch dairies: in Ireland, where the butter is generally of very fine quality, the common method is, to churn the milk and cream together: the milk being allowed to stand so long as it wheys on the top. It is thus said to produce more butter than in the usual mode of churning the cream alone; and the butter-milk is preferred, by those who are accustomed to it, to skim-milk.

In Holland, the mode is somewhat different. There the milk, when cold, is put into a vat, and frequently stirred to prevent the cream from separating from the milk; and this is continued until the milk becomes so thick that the ladle stands erect in it. It is then churned; and cold water is added, in order the better to effect the separation of the butter. In this manner, the Dutch dairy-women also say, that more butter is obtained from the milk than in any other; and they also insist, that both the butter and the butter-milk are better than in any mode adopted in this country. This, however, is the opinion of the advocates of each different system; all of whom consider their own as the best; and, without comparative experiments, it is difficult to decide which has the advantage. The chief distinction lies between the two methods of churning, either the cream alone, or the cream and milk together; the latter, as we have already seen, is said to produce most butter; but it excludes the making of skim-milk cheese, which is a profitable object of dairy economy; and, if it be true, that more butter is got in this manner than in the other, it must also be evident, that there cannot be so much nutriment left in the butter-milk as in the skim-milk. In Scotland and Ireland, however, butter-milk is an object of great consumption as food for the peasantry, by whom it is preferred to skim-milk, and it can be preserved longer for use. In large dairies, the labor of churning the milk and cream together is very considerable; but, on the other hand, so is the trouble of skimming, when the cream is to be churned alone. As the object of both processes is to extract as much as possible of the substance of the milk, it would probably be found, on a minute comparison, that, whether that be effected in the shape of butter, of cheese, or of nutritive food left in the milk or whey, either, when equally well performed, would be nearly equally profitable.

[To be continued.]

* Aiton on the Dairy Husbandry of Ayrshire, chap. III. sect. 3.

REMARKS ON MR. SPALDING'S ESSAY ON THE INTRODUCTION AND CULTURE OF COTTON.

To the Editor of the Farmers' Register.

In common with your other readers, I have been interested by the perusal of an article, (from the Southern Planter) in the number of your journal for November last, from the pen of Mr. Spalding of Sapelo, Ga., relating to the introduction of cotton into the United States—the progress of its culture, &c. The readers of the agricultural journals in this country are largely indebted to Mr. Spalding. His authority on the subject of cotton, especially the sea island cotton, is so great that I have thought it worth while to notice, in your journal, what I take to be a material error of his, in relation to the *species* of the sea island cotton. After enumerating four different species of the cotton plant (genus *gossypium*) to wit:—G. herbaceum, G. hirsutum, G. barbadense, and G. arboreum; he says that the sea island cotton of Georgia and Carolina, belongs to the last species, the Gossypium arboreum; whereas, I think it belongs to the third species, the *G. barbadense*, or Barbadoes cotton.

The "Encyclopædia of Plants," a late work of high authority on botanical subjects, has the following remarks: "*Gossypium herbaceum*" (our green seed cotton) "is the only species cultivated in Europe, especially in the Levant, and in Malta, Sicily, and Naples; it is also grown in many parts of Asia.

"G. hirsutum (our Mexican cotton) is occasionally grown in the West Indies; but *G. barbadense* is the prevailing species there. In the East Indies, and in China, G. herbaceum and G. arboreum are cultivated, and some other species, especially that which produces the nankeen colored down, not yet introduced into Europe.

"The Barbadoes cotton plant is sown in the West Indies, in rows about five feet asunder. The wool is cleared from the seeds by a machine called a *gin*, composed of two or three wooden rollers of about one inch in diameter, ranged horizontally close and parallel to each other in a frame, and made to revolve in contrary directions."

The following are the specific characters of the G. barbadense—upper leaves three lobed, lower five lobed, with three glands beneath—stem smoothish. In the artificial botanical system of Linnæus, the cotton plant *Gossypium*, belongs to the class Monadelphia, order Polyandria. In the natural system of Linnæus, it belongs to the order Columniferæ, the stamens being united on a central column, or tube, which also encloses the pistillum. In the natural system of *Jussieu*, which has superseded the natural system of Linnæus, it belongs to the order *Malvaceæ*, ranking with the genus *Malva* (mallows) and *Hibiscus*, which includes the *okra* (hibiscus esculentus) of our gardens.

Mr. Spalding is too exclusive when he says, "that the production of this sea island cotton is confined to the country extending along the coast from Georgetown, in South Carolina, to the St. Mary's in Georgia." This cotton has been produced in Middle Florida, since its first settlement, about the year 1822; and the crops made here have been annually sold in the Charleston market, at prices a little exceeding, generally, those of the "Mains and Santees," though not quite equalling good "sea islands." Moreover, it is produced from the coast to the distance of thirty miles inland; but at the same time, it is not denied that the presence of *sea air* is beneficial to this crop. If I have not been misinformed, this cotton is also produced by the planters on the St. John's in East Florida, and was formerly produced in the Bahamas, until the ravages of the caterpillar compelled its abandonment. I think it may be doubted, whether Mr. Spalding is correct in the opinion, that this cotton becomes less fine when carried *south* of the St. Mary's. It is probably a native of a tropical climate, and therefore, most probably, would not be less fine when produced in the West Indies. I have heard that some of this cotton produced at Cape Sable, has commanded fifty cents per pound in the Charleston market, without unusual care in its growth and preparation.

In limiting the range of the short staple cottons to 200 miles of the sea coast, Mr. Spalding appears to have overlooked North Alabama and West Tennessee. In receding from the sea coast, however, two causes are constantly operating against the growth of cotton; a higher latitude, and a greater elevation, both tending to produce a colder climate. To these causes may probably be added a third, the loss of sea air. Other things being equal, the cotton planter, therefore, should prefer the neighborhood of the sea coast.

To pass to other topics, I may observe, that the cotton planters of Middle Florida, can this year bear testimony to the great superiority, in productiveness, of what is called the "Petit Gulf cotton." Wherever, in this country, it has been tried, its superiority is freely admitted, and some most abundant crops have been obtained from it the present season. It appears to be a variety of the Mexican cotton, (G. hirsutum) it having the *rough stem and petiole* of that species. It is said to be the effect of some peculiarity of soil along the Mississippi river, between the 32nd and 33rd degrees of latitude.

H. B. CROOM.

Middle Florida, December, 1834.

P. S. It is to be regretted, that the common names of plants, often carry with them no certainty beyond the neighborhood in which they are used. Thus I was deceived in regard to the "partridge pea" of one of your correspondents. In one of your late numbers, speaking of the price of the seeds of the *locust tree*, you appear to refer to the honey locust *(Gleditschia triacanthos;)* whereas, I would suppose that another tree, the Robinia pseudacacia, was meant, which is sometimes called white locust, sometimes black locust, and sometimes yellow locust.

[The native locust, and not the honey locust, was the tree spoken of in the article referred to above.]

ORIGIN OF "HERBEMONT'S MADEIRA GRAPE."

To the Editor of the Farmers' Register.

* * Since I wrote to answer your inquiry, I have learned a little more concerning the origin of the vine called "Herbemont's Madeira." It certainly has been received from France, under different names, and also from Madeira. It is most undoubtedly one of the most esteemed families of vines in Europe. In certain situations in this country, Charleston for example, it does most admirably well. It has been received from France by the names of "Muscat gris," "Pineau," and "Maurillon." I have not yet been able to learn by what name it has been received from Madeira. It changes some of its characters so much in this country, as scarcely to be known again—for here it grows to the size and vigor of our strongest native vines. The nomenclature of the vines is, in Europe, in such a chaotic state, that it would take the labors of at least twenty Hercules to clear it up. Now that this culture is fairly begun in this country, we should be very particular with our names; and confusion in nomenclature is frequently inextricable, at the same time that it is exceedingly disadvantageous to the cultivators. The names should be short, if possible, and unchanged after they have been adopted. I would suggest, for example, that the excellent kinds introduced by the names of "Norton's Virginia Seedling," and "Cunningham's Prince Edward," be simplified, by suppressing every thing but the names of the gentlemen entitled to the honor of naming them.

N. HERBEMONT.

A TABLE SHOWING THE NUMBER OF SPACES CONTAINED IN AN ACRE OF LAND, AT VARIOUS GIVEN DISTANCES.

Abridged from the American Farmer of 1820.

Feet.		Feet.	
40	by	40	27
39	"	39	28
38	"	38	30
37	"	37	31
36	"	36	33
35	"	35	35
34	"	34	37
33	"	33	40
32	"	32	42
31	"	31	45
30	"	30	48
29	"	29	51
28	"	28	55
27	"	27	59
26	"	26	64
25	"	25	69
24	"	24	75
23	"	23	82
22	"	22	90
21	"	21	98
20	"	20	108
do	"	19	114
do	"	18	121
do	"	17	128
do	"	16	136
do	"	15	145
do	"	14	155
do	"	13	167
do	"	12	181
do	"	11	198
do	"	10	217
do	"	9	242
do	"	8	272
do	"	7	311
do	"	6	363
do	"	5	435
19	"	19	120
do	"	18	127
do	"	17	134
do	"	16	143
do	"	15	152
do	"	14	163
do	"	13	176
do	"	12	191
do	"	11	208
do	"	10	229
do	"	9	254
do	"	8	286
do	"	7	327
do	"	6	390
do	"	5	458
18	"	18	134
do	"	17	142
do	"	16	151
do	"	15	161
do	"	14	172
do	"	13	186
do	"	12	201
do	"	11	220
do	"	10	242
do	"	9	268
do	"	8	302
do	"	7	345
do	"	6	403
do	"	5	484

Ft.		Ft.	
17	by	17	150
do	"	16	160
do	"	15	170
do	"	14	180
do	"	13	197
do	"	12	213
do	"	11	232
do	"	10	256
do	"	9	284
do	"	8	320
do	"	7	366
do	"	6	427
do	"	5	512
16	"	16	170
do	"	15	181
do	"	14	194
do	"	13	209
do	"	12	226
do	"	11	247
do	"	10	272
do	"	9	302
do	"	8	340
do	"	7	388
do	"	6	453
do	"	5	544
15	"	15	193
do	"	14	207
do	"	13	223
do	"	12	242
do	"	11	264
do	"	10	290
do	"	9	322
do	"	8	363
do	"	7	414
do	"	6	484
do	"	5	580
14	"	14	222
do	"	13	239
do	"	12	259
do	"	11	282
do	"	10	311
do	"	9	345
do	"	8	388
do	"	7	443
do	"	6	518
do	"	5	622
13	"	13	257
do	"	12	279
do	"	11	304
do	"	10	335
do	"	9	373
do	"	8	418
do	"	7	478
do	"	6	558
do	"	5	670
12	"	12	302
do	"	11	330
do	"	10	363
do	"	9	403
do	"	8	453
do	"	7	518
do	"	6	605
do	"	5	720
11	"	11	360
do	"	10	396

Ft.		Ft. In.	
11	by	9	440
do	"	8	495
do	"	7	565
do	"	6	660
do	"	5	792
10	"	10	435
do	"	9 6	458
do	"	9 0	484
do	"	8 6	512
do	"	8 0	544
do	"	7 6	580
do	"	7 0	622
do	"	6 6	670
do	"	6 0	726
do	"	5 6	792
do	"	5 0	871
do	"	4 6	968
do	"	4 0	1089
do	"	3 6	1244
do	"	3 0	1452
do	"	2 6	1742
do	"	2 0	2178
do	"	1 6	2904
do	"	1 0	4356
9 6	"	9 6	482
do	"	9 0	509
do	"	8 6	539
do	"	8 0	573
do	"	7 6	611
do	"	7 0	655
do	"	6 6	705
do	"	6 0	764
do	"	5 6	833
do	"	5 0	917
do	"	4 6	1035
do	"	4 0	1146
do	"	3 6	1310
do	"	3 0	1528
do	"	2 6	1834
do	"	2 0	2292
do	"	1 6	3056
do	"	1 0	4585
9	"	9 0	537
do	"	8 6	569
do	"	8 0	605
do	"	7 6	645
do	"	7 0	691
do	"	6 6	744
do	"	6 0	806
do	"	5 6	880
do	"	5 0	968
do	"	4 6	1075
do	"	4 0	1210
do	"	3 6	1382
do	"	3 0	1613
do	"	2 6	1936
do	"	2 0	2420
do	"	1 6	3226
do	"	1 0	4840
8 6	"	8 6	602
do	"	8 0	640
do	"	7 6	682
do	"	7 0	732
do	"	6 6	788
do	"	6 0	854
do	"	5 6	731
do	"	5 0	1024
do	"	4 6	1138
do	"	4 0	1281
do	"	3 6	1464

Ft.		Ft.In.	
8 6	by	3 0	1708
do	"	2 6	2049
do	"	2 0	2562
do	"	1 6	3416
do	"	1 0	5124
8	"	8 0	680
do	"	7 6	726
do	"	7 0	777
do	"	6 6	837
do	"	6 0	905
do	"	5 6	990
do	"	5 0	1089
do	"	4 6	1210
do	"	4 0	1361
do	"	3 6	1555
do	"	3 0	1815
do	"	2 6	2178
do	"	2 0	2722
do	"	1 6	3630
do	"	1 0	5445
7 6	"	7 6	774
do	"	7 0	829
do	"	6 6	893
do	"	6 0	968
do	"	5 6	1056
do	"	5 0	1161
do	"	4 6	1290
do	"	4 0	1452
do	"	3 6	1659
do	"	3 0	1936
do	"	2 6	2323
do	"	2 0	2904
do	"	1 6	3872
do	"	1 0	5808
7	"	7 0	888
do	"	6 6	957
do	"	6 0	1037
do	"	5 6	1131
do	"	5 0	1244
do	"	4 6	1382
do	"	4 0	1555
do	"	3 6	1777
do	"	3 0	2074
do	"	2 6	2489
do	"	2 0	3111
do	"	1 6	4148
do	"	1 0	6222
6 6	"	6 6	1031
do	"	6 0	1116
do	"	5 6	1218
do	"	5 0	1340
do	"	4 6	1489
do	"	4 0	1675
do	"	3 6	1914
do	"	3 0	2233
do	"	2 6	2680
do	"	2 0	3350
do	"	1 6	4467
do	"	1 0	6701
6	"	6 0	1210
do	"	5 9	1262
do	"	5 6	1320
do	"	5 3	1382
do	"	5 0	1452
do	"	4 9	1528
do	"	4 6	1613
do	"	4 3	1708
do	"	4 0	1815
do	"	3 9	1936
do	"	3 6	2074

Ft.		Ft. In.		Ft.		Ft In.		Ft.		Ft. In.		Ft.		Ft. In.	
6	by	3 3	2233	5 3	by	3 9	2212	4 6	by	2 0	4840	3 3	by	3 3	4124
do	"	3 0	2420	do	"	3 6	2370	do	"	1 9	5531	do	"	3 0	4818
do	"	2 9	2640	do	"	3 3	2552	do	"	1 6	6453	do	"	2 9	4873
do	"	2 6	2904	do	"	3 0	2765	do	"	1 3	7744	do	"	2 6	5361
do	"	2 3	3226	do	"	2 9	3017	do	"	1 0	9680	do	"	2 3	5956
do	"	2 0	3630	do	"	2 6	3318	4 3	"	4 3	2411	do	"	2 0	6701
do	"	1 9	4148	do	"	2 3	3687	do	"	4 0	2562	do	"	1 9	7658
do	"	1 6	4840	do	"	2 0	4148	do	"	3 9	2733	do	"	1 6	8935
do	"	1 3	5808	do	"	1 9	4741	do	"	3 6	2914	do	"	1 3	10722
do	"	1 0	7260	do	"	1 6	5531	do	"	3 3	3153	do	"	1 0	13403
5 9	"	5 9	1317	do	"	1 3	6637	do	"	3 0	3416	3	"	3 0	4840
do	"	5 6	1377	do	"	1 0	8297	do	"	2 9	3727	do	"	2 9	5289
do	"	5 3	1442	5	"	5 0	1742	do	"	2 6	4099	do	"	2 6	5808
do	"	5 0	1515	do	"	4 9	1834	do	"	2 3	4555	do	"	2 3	6453
do	"	4 9	1594	do	"	4 6	1936	do	"	2 0	5124	do	"	2 0	7260
do	"	4 6	1683	do	"	4 3	2049	do	"	1 9	5856	do	"	1 9	8297
do	"	4 3	1782	do	"	4 0	2178	do	"	1 6	6832	do	"	1 6	9680
do	"	4 0	1893	do	"	3 9	2323	do	"	1 3	8199	do	"	1 3	11616
do	"	3 9	2020	do	"	3 6	2489	do	"	1 0	10249	do	"	1 0	14520
do	"	3 6	2164	do	"	3 3	2680	4	"	4 0	2722	2 9	"	2 9	5760
do	"	3 3	2330	do	"	3 0	2904	do	"	3 9	2904	do	"	2 6	6336
do	"	3 0	2525	do	"	2 9	3168	do	"	3 6	3111	do	"	2 3	7040
do	"	2 9	2754	do	"	2 6	3484	do	"	3 3	3350	do	"	2 0	7920
do	"	2 6	3030	do	"	2 3	3872	do	"	3 0	3630	do	"	1 9	9051
do	"	2 3	3366	do	"	2 0	4356	do	"	2 9	3960	do	"	1 6	10560
do	"	2 0	3787	do	"	1 9	4978	do	"	2 6	4356	do	"	1 3	12670
do	"	1 9	4328	do	"	1 6	5808	do	"	2 3	4840	do	"	1 0	15840
do	"	1 6	5050	do	"	1 3	6969	do	"	2 0	5445	2 6	"	2 6	6969
do	"	1 3	6060	do	"	1 0	8712	do	"	1 9	6222	do	"	2 3	7740
do	"	1 0	7575	4 9	"	4 9	1930	do	"	1 6	7260	do	"	2 0	8712
5 6	"	5 6	1417	do	"	4 6	2037	do	"	1 3	8712	do	"	1 9	9956
do	"	5 3	1508	do	"	4 3	2157	do	"	1 0	10890	do	"	1 6	11616
do	"	5 0	1584	do	"	4 0	2292	3 9	"	3 9	3097	do	"	1 3	13939
do	"	4 9	1667	do	"	3 9	2445	do	"	3 6	3318	do	"	1 0	17424
do	"	4 6	1760	do	"	3 6	2620	do	"	3 3	3574	2 3	"	2 3	8604
do	"	4 3	1863	do	"	3 3	2821	do	"	3 0	3872	do	"	2 0	9680
do	"	4 0	1980	do	"	3 0	3056	do	"	2 9	4224	do	"	1 9	11062
do	"	3 9	2112	do	"	2 9	3334	do	"	2 6	4646	do	"	1 6	12906
do	"	3 6	2262	do	"	2 6	3668	do	"	2 3	5162	do	"	1 3	15488
do	"	3 3	2436	do	"	2 3	4075	do	"	2 0	5808	do	"	1 0	19360
do	"	3 0	2640	do	"	2 0	4585	do	"	1 9	6637	2	"	2 0	10890
do	"	2 9	2880	do	"	1 9	5248	do	"	1 6	7744	do	"	1 9	12445
do	"	2 6	3168	do	"	1 6	6113	do	"	1 3	9272	do	"	1 6	14520
do	"	2 3	3520	do	"	1 3	7336	do	"	1 0	11616	do	"	1 3	17424
do	"	2 0	3960	do	"	1 0	9170	3 6	"	3 6	3555	do	"	1 0	21780
do	"	1 9	4525	4 6	"	4 6	2151	do	"	3 3	3829	1 9	"	1 9	14223
do	"	1 6	5280	do	"	4 3	2277	do	"	3 0	4148	do	"	1 6	16594
do	"	1 3	6336	do	"	4 0	2420	do	"	2 9	4525	do	"	1 3	19913
do	"	1 0	7920	do	"	3 9	2581	do	"	2 6	4978	do	"	1 0	24454
5 3	"	5 3	1580	do	"	3 6	2765	do	"	2 3	5531	1 6	"	1 6	19360
do	"	5 0	1659	do	"	3 3	2978	do	"	2 0	6222	do	"	1 3	23232
do	"	4 9	1746	do	"	3 0	3226	do	"	1 9	7111	do	"	1 0	29040
do	"	4 6	1843	do	"	2 9	3520	do	"	1 6	8297	1 3	"	1 3	27878
do	"	4 3	1970	do	"	2 6	3872	do	"	1 3	9956	do	"	1 0	34848
do	"	4 0	2074	do	"	2 3	4302	do	"	1 0	12445	1	"	1 0	43560

From the Genesee Farmer.

HUSSEY'S MACHINE FOR HARVESTING WHEAT.

The machine has been very fully tried, and I am gratified to be able to say, that it has as fully succeeded. Hundreds of farmers, from the different towns of this and the adjoining counties, have witnessed its operations, and all have not only expressed their confidence in its success, but their gratification in the perfection of its work.

As every inquirer asks the same series of questions, I presume your readers will have a like course of thought, and wish for satisfaction in the same particulars. To give them this, I will write them in their order, and give the answers.

Does the machine make clean work?

It saves all the grain; to use the language of a gratified looker on, an old and experienced farmer, "it cheats the hogs."*

Does the machine expedite the work?

What the machine is capable of accomplishing, we who have used it can hardly say, as we had no field, in fit order, large enough for a fair trial through a whole day; and can only say what it has done. Five acres of heavy wheat on the

*The hogs are the gleaners in this section of country.

Genesee flats were harvested in two hours and a quarter.

In what condition is the wheat left, and how is the work done, where the grain is lodged?

The machine leaves the wheat in gavels large enough for a sheaf, and where the grain stands well enough to make fair work with a cradle, it leaves the straw in as good condition to bind as the gavels of a good reaper. Whether the grain stands or is lodged is of little consequence, except as to the appearance of the sheaf, and the necessity of saving more straw, when lodged, than is desirable. The condition of the sheaf, when the grain is lodged, depends much upon the adroitness of the raker.

What number of hands, and what strength of team is necessary to manage the machine advantageously?

Two men, one to drive the team and the other to rake off the wheat, and two horses work the machine; but when the grain is heavy, or the land mellow, a change of horses is necessary, as the gait of the horses is too rapid to admit of a heavy draft. The horses go at the rate of four to five miles an hour, and when the growth of straw is not heavy, a fair trot of the team is not too much.

Is the machine liable to derangement and destruction from its own motion?

This is a question which cannot be so directly answered as the others. We have only used the machine to cut about fifty acres, and have had no trouble; judging from appearance so far, should say it was as little subject to this evil as any machinery whatever. The wear upon the cutting part being so little as to require not more than fifteen minutes sharpening in a day, there is no loss of time on this score.

Is the sheaf a good one to thrash?

The man who has fed the thrashing machine with the grain of twenty acres cut by this machine, says the sheaves are much better than those of cradled grain, and quite as good as those of a reaper.

There is one more advantage beyond ordinary inquiries, of consequence where so much grain is raised as in this valley; be the grain ever so ripe, there is no waste of grain by any agitation of the straw, and all the waste which can take place must arise from the handling and shaking in binding.

I am yours, &c.

WILLIAM C. DWIGHT.

Moscow, Liv. co., Nov. 14th, 1834.

N. B. The machine we used was intended only for upland; but by some little alterations and additions, we used it with equal facility on all kinds of soil; and it can be used on any farm so clean from stumps and stones as not to endanger the blocking of the wheels.

From the Library of Useful Knowledge, Farmer's Series.

GENERAL HISTORY OF THE HORSE.

[Continued from page 547, Vol. II.]

The East Indian Horse.

We will now travel further eastward, and look at the breeds of horses in our Indian possessions. First, we have the *Toorky*, originally from a Toorkoman and a Persian, beautiful in his form, graceful in his action, and docile in his temper. It is said that, when skilfully managed, the grandeur and stateliness of his carriage are equal to what the warmest imagination can conceive of the horse: his spirit rising as his exertions are required, he exhibits to his beholders an appearance of fury in the performance of his task, yet preserving to his rider the utmost playfulness and gentleness.

Next comes the *Iranee*, well limbed, and his joints closely knit, and particularly powerful in the quarters, but with scarcely sufficient spirit, and his ears large and loose.

The patient and docile *Coxakee* is deep in the girth, powerful in the fore-arm, but with large head, and sadly cat-hammed; hardy, and calculated for long journeys and severe service.

The *Mojinnis* have spirit, beauty, speed, and perseverance.

The *Tazsee* is slight, hollow-backed, and, for that reason perhaps, although deficient in strength and leaving as it were his hind legs behind him, and likewise irritable in temper, yet sought after on account of the peculiar easiness of his pace.

A sale of horses near the Company's stud at Hissar, is thus described by an excellent judge. "Not less than one thousand horses were shown. They were all above fourteen hands and a half in height, high-crested, and showy-looking horses. The great defect seemed a want of bone below the knee, which is indeed general to all the native horses throughout India; and also so great a tendency to fulness in the hocks, that, in England, it would be thought half of them had blood spavins."

The Chinese Horse.

This breed is small, weak, ill-formed, without spirit, and altogether undeserving of notice.

The Persian Horse.

Returning westward we find the Persian next in estimation, and deservedly so, to the Arabian. The head is almost equally beautiful, the crupper superior; he is equal in speed, but far inferior in endurance. The whole frame is more developed than in the Arabian.

The Persian horses were celebrated for many a century before the Arabians were known, or even existed. They constituted, in ancient times the best cavalry of the east. The native Persian was so highly prized, that Alexander considered one of them the noblest gift he could bestow, and when the kings of Parthia would propitiate their divinities by the most costly sacrifice, a Persian horse was offered on the altar. An entertaining traveller (Sir R. Ker Porter) bears testimony that they have not now degenerated. He gives the following account of this breed.

"The Persian horses never exceed fourteen or fourteen and a half hands high, yet certainly, in the whole, are taller than the Arabs. Those of the desert and country about Hillah run very small, but are full of bone and of good speed. General custom feeds and waters them only at sun-rise and sun-set, when they are cleaned. Their usual provender is barley and chopped straw, which, if the animals are piqueted, is put into a nose-bag and hung from their heads; but if stabled, it is thrown into a small lozenge-shaped hole left in the thickness of the mud-wall for that purpose, but much higher up than the line of our mangers, and there the animal eats at his leisure. Hay is a kind of food not known here. The bedding of the horse

consists of his dung. After being exposed to the drying influence of the sun during the day, it becomes pulverized, and, in that state, is nightly spread under him.* Little of it touches his body, that being covered by his clothing, a large *nummud* from the ears to the tail, and bound firmly round his body by a very long surcingle. But this apparel is only for cold weather; in the warm season the night-clothes are of a lighter substance, and during the heat of the day, the animal is kept entirely under shade.

"At night he is tied in the court yard. The horses' heads are attached to the place of security by double ropes from their halters, and the heels of their hinder legs are confined by cords of twisted hair, fastened to iron rings, and pegs driven into the earth. The same custom prevailed in the time of Xenophon, and for the same reason, to secure them from being able to attack and maim each other, the whole stud generally consisting of stallions. Their keepers, however, always sleep on their rugs amongst them to prevent accident; and sometimes, notwithstanding all this care, they manage to break loose, and then the combat ensues. A general neighing, screaming, kicking, and snorting, soon rouses the grooms, and the scene for awhile is terrible. Indeed no one can conceive the sudden uproar of such a moment who has not been in Eastern countries to hear it, and then all who have, must bear me witness that the noise is tremendous. They seize, bite, and kick each other with the most determined fury, and frequently cannot be separated before their heads and haunches stream with blood. Even in skirmishes with the natives, their horses take part in the fray, tearing each other with their teeth, while their masters are in similar close quarters on their backs."

His description of a Persian race does not altogether remind us of Newmarket or Doncaster.

"My curiosity was fully on the spur to see the racers, which I could not doubt must have been chosen from the best in the nation to exhibit the perfection of its breed before the sovereign. The rival horses were divided into three sets, in order to lengthen the amusement. They had been in training for several weeks, going over the ground very often during that time; and when I did see them, I found so much pains had been taken to sweat and reduce their weight, that their bones were nearly cutting the skin. The distance marked for the race was a stretch of four-and-twenty miles, and, that his majesty might not have to wait when he had reached the field, the horses had set forward long before, by three divisions, from the starting point, (a short interval of time passing between each set,) so that they might begin to come in, a few minutes after the king had taken his seat. The different divisions arrived in regular order at the goal, but all so fatigued and exhausted, that their former boasted fleetness hardly exceeded a moderate canter when they passed before the royal eyes."

In Circassia almost every family of distinction, whether of princes or nobles, boasts of possessing a peculiar race of horses, which, when young, are burned on the buttock with a particular mark. On this occasion, they act with the most scrupulous adherence to custom, so that a person who should attempt to burn a character expressing noble descent, on a filly of a common race, would, for such forgery, forfeit his life. The most celebrated race of Circassian horses has received the name of Shalokh, and is in the exclusive possession of the Tau Sultan family. This race is valuable for its strength and swiftness, more than its peculiar beauty. Its distinguishing mark is a full horse-shoe, without an arrow.

The Toorkoman Horse.

Turkistan is that part of South Tartary, north-east of the Caspian sea, and has been celebrated from very early times, for producing a pure and valuable breed of horses. They are called *Toorkomans*. They are said to be preferable even to the pure Persians, for service. They are large, standing from fifteen to sixteen hands high; swift, and inexhaustible under fatigue. Some of them have travelled nine hundred miles in eleven successive days. They, however, are somewhat too small in the barrel—too long on the legs—occasionally ewe-necked, and always have a head out of proportion large: yet, such are the good qualities of the horse, that one of the pure blood is worth two or three hundred pounds, even in that country.

Captain Fraser, who is evidently a good judge of the horse, (in his Journey to Khorasan) thus relates the impression which they made on him: "They are deficient in compactness. Their bodies are long in proportion to their bulk. They are not well-ribbed up. They are long on the legs—deficient in muscle—falling off below the knee,—narrow chested—long necked—head large, uncouth, and seldom well put on. Such was the impression I received from the first sight of them, and it was not for some time that their superior valuable qualities were apparent to me".

The Tartar and Calmuck Horse.

The horses of the other parts of Tartary, comprehending the immense plains of Central Asia, and a considerable part of European Russia, are little removed from a wild state; they are small and badly made; but capable of supporting the longest and most rapid journey, on the scantiest fare. The foals, from the earliest period, are exposed to the inclemency of the weather, have little to eat, and follow their dams in the longest excursions, and, therefore, soon acquire a very great power of sustaining fatigue. They must be hardy for another reason. The Tartars live much on the flesh of horses, and, consequently, those animals that are unable to support the labor of their frequent rapid emigrations are soon destroyed, and only the more vigorous preserved.

The horses, which range at large over the plains, are divided into herds, at the head of which are placed two stallions, who carefully prevent them from intermingling with each other, and it is rarely that a foal is lost. On the approach of a strange herd, the stallions drive their own into a close body, place themselves in front, and, if necessary, attack and drive off the others. As the stallion-foals grow up, they are driven away from the herd, and are seen straggling about at a distance, until they

*It is the usual flooring of the staple and the tent. The united influence of the sun and air deprive it of all unpleasant odor, and when from use it becomes a second time offensive, it is again exposed to the sun, and all unpleasant smell once more taken away.

are strong enough to form herds of wild mares for themselves.

These horses, or those of a similar breed and habits, were beaten by not the first rate English blood-horses, in a race which fairly put to the test both their speed and stoutness. On the 4th of August, 1825, a race of the cruel distance of more than forty-seven miles was run between two Cossack and two thorough-bred English horses—Sharper and Mina. The most celebrated Cossack horses from the Don, the Black Sea, and the Ural, were sent; and, after numerous trials, the best were selected. On starting, the Cossacks took the lead at a moderate pace, the English following at about three or four lengths, but before they had gone half a mile, the stirrup-leather of Sharper broke, and he ran away with his rider, followed by Mina, and they went more than a mile, and up a steep hill, before they could be held in.

Half the distance was run in an hour and four minutes. Both the English horses were then fresh, and one of the Cossacks. On their return, Mina fell lame, and was taken away. The Cossack horse, likewise, began to flag, when the accompanying Russians began to drag him on by the bridle, throwing away the saddle, and putting a mere child on his back. Sharper, likewise, evidently showed the effects of the pace at which he had gone when running away, and was much distressed. The Cossacks then had recourse to foul play, and actually *carried on* their horse; some dragging him on by a rope, and the bridle at his head; and others pulling him on by the tail, and riding alongside of his quarters to support him, and relieving each other at this fatiguing work. Sharper did the whole distance in two hours and forty-eight minutes, and the Cossack horse was warped in, eight minutes after him. At starting, the English horses carried full three stone more than the Cossacks; and during the latter half of the race, a mere child had ridden the Cossack.

The Turkish Horse.

The Turkish horses are descended principally from the Arab, crossed by the Persian and certain other bloods. The body, however, is even longer than the Arabian's, and the crupper more elevated. They have contributed materially to the improvement of the English breed. The Byerley and the Helmsley Turk, are names familiar to every one conversant with horses, and connected with our best blood.

The learned and benevolent Busbequius, who was ambassador at Constantinople in the seventeenth century, gives the following account of the Turkish horses. Our grooms, and their masters too, may learn a lesson of wisdom and humanity from his words.

"There is no creature so gentle as a Turkish horse, nor more respectful to his master, or the groom that dresses him. The reason is, because they treat their horses with great lenity. I myself saw, when I was in Pontus, passing through a part of Bithinia, called Axilos, towards Cappadocia, how indulgent the countrymen were to young colts, and how kindly they used them soon after they were foaled. They would stroke them, bring them into their houses, and almost to their tables, and use them even like children. They hung something like a jewel about their necks, and a garter, which was full of amulets against poison, which they are most afraid of. The grooms that dress them are as indulgent as their masters; they frequently sleek them down with their hands, and never use a cudgel to bang their sides, but in cases of necessity. This makes their horses great lovers of mankind; and they are so far from kicking, wincing, or growing untractable by this gentle usage, that you will hardly find a masterless horse amongst them.

"But, alas! our christian grooms' horses go on at another rate. They never think them rightly curried till they thunder at them with their voices, and let their clubs or horse-whips, as it were, dwell on their sides. This makes some horses even tremble when their keepers come into their stable; so that they hate and fear them too. But the Turks love to have their horses so gentle, that at the word of command they may fall on their knees, and in this position receive their riders.

"They will take up a staff or club upon the road with their teeth, which their rider has let fall, and hold it up to him again; and when they are perfect in this lesson, then, for credit, they have rings of silver hung on their nostrils as a badge of honor and good discipline. I saw some horses when their master was fallen from the saddle stand stock still without wagging a foot till he had got up again. Another time I saw a groom standing at a distance in the midst of a whole ring of horses, and, at the word of command, they would either go round or stand still. Once I saw some horses when their master was at dinner with me in an upper room, prick up their ears to hear his voice, and when they did so, they neighed for joy."

The German Horse.

The German horses are generally large, heavy, and slow. The Hungarian may be an exception, being lighter, speedier, and giving greater proof of eastern blood.* Every part of the continent, however, following the example of England, has been diligently engaged in the improvement of its breed, and the German and Prussian horses are now better proportioned, and have considerable endurance, but are still deficient in speed. The Prussian, German, and the greater part of the French cavalry are procured from Holstein. They are of a dark glossy, bay color, with small heads, large nostrils, and full dark eyes, the fire and clearness of which seem to denote the inward spirit of the animal. They are beautiful, active, and strong.

The Swedish, Finland, and Norwegian Horse.

Of the *Swedish* horses, Clarke, in his "Scandinavia," says, that they are small but beautiful, and remarkable for their speed and spirit. Those of Finland he describes as yet smaller, not more than twelve hands high, beautifully formed, and very fleet. The peasants take them from the forests when they are wanted for travellers. Although apparently wild, they are under perfect control, and they trot along with ease at the rate of twelve miles an hour."

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* M. de Buffon strangely affirms, that the Hussars and Hungarians slit the nostrils of their horses with a view to increase their wind, and to prevent their neighing; and that Hungarian, Croatian, and Polish horses continue to old age to have the mark in all their fore-teeth.

The following story is told of one of the *Norwegian* horses. His master had been dining at a neighboring town, and, when it was time to return, had exceeded so much, that he could not keep a firm seat in his saddle. The horse regulated himself, as well as he could, according to the unsettled motion of his rider, but, happening to make a false step, the peasant was thrown, and hung with one foot entangled in the stirrup. The horse immediately stopped, and twisting his body in various directions, endeavored to extricate his master, but in vain. The man was severely hurt, and almost helpless; but the shock had brought him to his senses. The horse looked at him as he lay on the ground, and, stooping, laid hold of the brim of his hat; and raised his head a little; but the hat coming off, he fell again. The animal then laid hold of the collar of his coat, and raised him by it so far from the ground, that he was enabled to draw his foot out of the stirrup. After resting awhile he regained the saddle, and reached his home. Grateful to his preserver, the man did, what every good feeling bid him—he cherished the animal until it died of old age.

Many an English farmer owes a considerable debt of gratitude to his intelligent and faithful servant, who has taken care of him when he was unable to take care of himself, and, possibly, has preserved his life. Let him repay the debt by kinder usage.

The Iceland Horse.

There are numerous troops of horses in this cold and inhospitable country, descended, according to Mr. Anderson, from the Norwegian horse, but, according to Mr. Horrebow, being of Scottish origin. They are very small, strong, and swift. There are thousands of them in the mountains which never enter a stable, but instinct or habit has taught them to scrape away the snow, or break the ice, in search of their scanty food. A few are usually kept in the stable, but when the peasant wants more he catches as many as he needs, and shoes them himself, and that sometimes with a sheep's horn.*

The Flemish and Dutch Horse.

The *Flemish and Dutch* horses are large, and strongly and beautifully formed. We are indebted to them for some of the best blood of our draught-horses, and we still have frequent recourse to them for keeping up and improving the breed. They will be more particularly described when the cart-horse is spoken of.

The French Horse.

France contains, like England, numerous breeds of horses and considerable attention has lately been paid to their improvement; but they are far inferior to ours in beauty, fleetness, and strength. The provinces of Auvergne and Poitou produce good ponies and galloways; but the best French horses are bred in Limousin and Normandy. From the former district some excellent saddle-horses and hunters; and from the latter a stronger species, for the road, the cavalry, or the carriage. The Norman horses are now much crossed by our hunters, and occasionally by the thorough-bred; and the English roadster and light draught-horse has not suffered by a mixture with the Norman.

*Kerguelen's Voyage to the North.

The Spanish Horse.

Spain was early celebrated for her breed of horses. The Andalusian charger and the Spanish jennet are familiar to all readers of romance. The subjugation of so great a portion of the peninsula to the Moorish sway, by introducing so much of the Barbary blood, mainly contributed to the undisputed excellence of the Spanish horse. One breed, long in the limbs, and graceful in all its motions, was the favorite war-horse of the knight; while another race, carrying the esquire, although inferior in elegance, possessed far more strength and endurance. The Spanish horse of the present day is not much unlike the Yorkshire half-bred; perhaps with flatter legs and better feet, but far inferior figure.

The Italian Horse.

The Italian horses were once in high repute, particularly the Neapolitans; but like every thing else in those mismanaged countries, they have sadly degenerated. One circumstance has mainly contributed to this falling off in reputation and value, viz. that the breed has been kept up by occasional intermixture, not of Eastern, but of European blood. A few of the Neapolitan horses, from their superior size and stateliness, are well adapted for the carriage.

The American Horse.

In the extensive territory and varied climate of the United States, several breeds of horses are found.

The *Canadian* is found principally in Canada, and the Northern States. He is supposed to be of French descent, and many of the celebrated American trotters are of this breed. We will speak of some of them when we describe the paces of the horse.

The *Conestoga* horse is found in Pennsylvania, and the middle states—long in the leg and light in the carcass—sometimes rising seventeen hands, used principally for the carriage; but when not too high, and with sufficient substance, useful for hunting and the saddle.

The *English* horse, with a good deal of blood, prevails in Virginia and Kentucky; and is found, to a greater or less degree, in all the states. The Americans have, at different times, imported some of the best English blood. It has been most diligently and purely preserved in the Southern States. The celebrated Shark, the best horse of his day, and equalled by few at any time, was the sire of the best Virginian horses; and Tally-ho, a son of Highflyer, peopled the Jerseys.

In the back-settlements, and in the south-western states, is a horse resembling the wild horse of the Pampas, already described, and evidently of the same origin.

AN INQUIRY.

To the Editor of the Farmers' Register.

Seeing that it is becoming somewhat common to make application for agricultural information through the columns of your paper, I shall take the liberty of asking, what is the most effectual and shortest method of restoring to fertility, worn,

galled and gullied land? Cannot the intelligent and skilful proprietors of Cloverton and Pen Park give to the public a minute and circumstantial account of the management by which the above estates were "created anew?"—for there are many in this part of the state, which, to all the means now in use among us, are past the healing art. I observed in their respective communications to the Albemarle Agricultural Society, they recommended deep ploughing, as a most effective agent in the work of improvement. As deep ploughing is a comparative term, I for one, should be glad to know, what is considered by them, deep ploughing, in specific inches; or whether the depth of the ploughing is to be dependent on the natural depth of soil?

A SEEKER OF LIGHT.

From Loudon's Magazine.

COILING SYSTEM OF CULTIVATING THE VINE IN POTS.

By Mr. John Mearns, f. h. s. Gardener to his Grace the Duke of Portland, Welbeck, Nottinghamshire.

Sir—As I have communicated an account of my coiling system of cultivating the vine in pots to several persons, and have also given a statement of my experiments to the London Horticultural Society, I feel it to be a duty also to lay my practice before you.

This coiling system is certainly a completely new feature, and, I think, a very valuable one, in the art of grape-growing. Is it not a matter of great importance that, in consequence of my discovery, a gardener, who may go to a situation, in the autumn, where no grapes have previously been growing, may be enabled to produce there easily, for the ensuing season, from five hundred to one thousand bunches of fine grapes? All that are wanting to enable any gardener, so circumstanced, to do this, are, the prunings of the vines from any garden, that would otherwise be thrown away, and, of course, a convenient frame, pit, or house, for growing them in. If abundance of shoots can be procured, and there is a sufficient extent of frames, &c. either temporary or permanent, two, three, or five thousand bunches may thus be produced in a garden where grapes were never seen before.

The coiling system is nothing more than taking a long shoot or cutting from a vine, cutting out all the buds except a few at the upper end, and then beginning at the lower end, and coiling the shoot round and round, say from three to six or eight times, the inside of a pot of twelve or fourteen inches or more in diameter. The shoot may be of any length, from six feet to thirty feet, and it may be entirely of last year's wood; or the greater part of it may be of old wood, provided three or four feet at the upper end be of new wood; because, as every gardener knows, the buds from young wood are more certain than those from old wood of producing blossoms the first year. The vine being coiled round in the pot, and plenty of drainage being put in the bottom, take care that the end of the shoot left out of the pot, on which the fruit is to grow, be not injured at the point where it separates from the coil. This shoot may be two or three feet long; and, to keep it steady, it may be tied to a stake, or coiled round two or three stakes. After this, fill up the pot with a rich loamy soil, pressing it firmly against the coil, as if you were making firm the end of a cutting. Unless this is done in such a manner as to bring every part of the coil in close contact with the soil, it will not root so readily as it otherwise would do. The next operation is, to wrap up all that part of the stem which is above the pot with moss, and this moss must be kept constantly moist till the grapes are formed. The pot should now be plunged in bottom heat either in a pit or forcing-house; but, wherever it is plunged, care must be taken to regulate the temperature of the atmosphere of the house, in such a manner as to prevent the top of the vine from being excited before the roots. If this should happen, the young shoots produced will soon wither for want of nourishment. Abundance of air, therefore, should be given for several weeks, so as never to allow the temperature of the atmosphere of the house, frame, or pit, to exceed forty-five or fifty degrees, while the temperature of the medium in which the pots are plunged may be as high as sixty-five or seventy degrees. When, by examination, you find that fibres have protruded from the coil, the temperature of the atmosphere may then be gradually raised, when the buds will break and the shoots will grow apace.

The shoots proceeding from that part of the stem above the pot, should be led up to within eight or ten inches of the glass, and there trained, at that distance from it, towards the back of the pit or house. It is needless to state to the practical gardener, that each shoot will require to be shortened, freed from laterals, &c. Each vine will produce from three to twenty or more bunches, according to the length of coil and variety of grape. I have now (Jan. 17, 1834) upwards of two hundred coiled branches in pots, and nearly fifty of them in action; some with twenty bunches of fine grapes on them.

I was asked the other day, whether vines so treated would not require frequent shiftings into larger pots; or, at least, to be shifted once a year. To this I answered, that while we had a plentiful supply of prunings from our own vines, or could procure them from those of our friends, the best mode would be to treat the plants, after they had borne one crop, as we do the roots of asparagus and other plants that we force; that is, to throw them away. If, however, you should wish to keep the coiled plants a second year, and the pots should be found to be too full of roots, turn out the ball, shake the soil from the coil, and cut away all the roots close to the shoot; then re-pot it as before. If this be done in winter, the plant will produce an excellent crop the following season; probably a better one than if the roots were allowed to remain, and the ball shifted into a larger pot or box. The pot or box is in either case, soon filled with young vigorous fibres, like a hatch of young maggots, each eager for food, and consequently sending it up in abundance to supply the crop above. Can there be a doubt but that this is a far superior mode to keeping pots, or even fruit-tree borders, filled up with old inert roots?

Before my bunches are clearly developed, I have thousands of eager mouths or spongioles, extending along the coiled shoot, and each gaping for food; some of these rootlets are three feet long, and before the vines are out of blossom, many of them are six feet in length, and matted round and

round the pot. You will easily understand from this, how important it is to supply vines so treated with liquid manure, either by watering from above, or by a supply from a saucer or feeder from below.

Welbeck Gardens, Jan. 16, 1834.

Since we received the above account from Mr. Mearns, we have heard the article on the same subject, to which he alludes, read before a meeting of the horticultural society. In this paper, the names of a number of varieties are mentioned, which had been thus fruited; including the muscadines, black clusters, black Hamburgh, black Damascus, black Tripoli, muscat of Alexandria, &c. Mr. Mearns also mentions that, hearing of a new and fine variety of muscat, called the Candia, which had been a few years ago introduced into the Duke of Buccleugh's gardens, at Dalkeith, he wrote last autumn to Mr. Macdonald, the garden er there, for some of the prunings of this vine, and that he had, at the time the paper was written, (Feb. 1834,) plants of the Candia at Welbeck, from coils of the prunings received, with numerous bunches of fruit on them, which would ripen in April and May next.

We regard this discovery of Mr. Mearns as one of considerable importance, not only as showing what may be done in the particular case of the vine, but as tending to familiarise practical gardeners with some points in vegetable physiology. It is clear that the coiled shoot is a reservoir of nutriment to the young growth, in the same manner as the tuber of the potato is an accumulation of nutriment for the young shoots, which proceed from its buds or eyes when planted. To a certain extent, long shoots of any tree whatever if buried in the soil, either coiled or extended, and two or three inches or feet of their upper extremities kept out of the ground, would produce leaves, blossoms, and even fruit, the first year: but those shoots, which, from their nature, do not freely emit fibres, or do not emit them at all, would perhaps not set their fruit; or might even cease to produce leaves in the course of a few months. The reason, in that case, would be, that the reservoir of nourishment soon becomes exhausted, if it is not supplied from the soil; and that the only mode by which the shoot can obtain nourishment from the soil is by means of fibres, which it has either no power of producing at all, or cannot produce in sufficient abundance. The advantages of the coiling system are, that an almost unlimited number of fibres or mouths are produced by it, in a very limited portion of soil; that this soil can be rendered of the most suitable descriptions for the given plant, supplied abundantly with liquid manure, and renewed almost at pleasure. The use of cutting off all these fibres or mouths, when they get too long, is merely to keep them within a limited space; for when a fibre elongates, unless it has at the same time, room to branch out, so as to produce other fibrils, it can take in no more nourishment than when it is short, say an inch long; because the nourishment is only taken in by the spongiole, or point of the fibre. The whole art of rapid cultivation, both in ligneous and herbaceous vegetables, proceeds on this principle. The Lancashire gooseberry grower has recourse to it, when he shortens the roots of his plants at a certain distance from the stem, every two or three years; thus causing them to emit fibres, for which he prepares a circular trench of rich soil round each tree. Mr. Mearns's mode of treating the peach, and other fruit trees, and the mode of cultivating cabbages, and other plants of that kind, by picking out from the seed-bed, and transplanting and re-transplanting into rich soil, instead of sowing where the plants are finally to remain, all proceed on the principle of multiplying the mouths, and increasing the supply of rich food, within a limited space. The result of this is, both in ligneous and herbaceous plants, that maturity is obtained with less magnitude than in a natural state, and in a much shorter time. The essential principle is the abundant supply of rich nutriment; and the same principle produces exactly the same results in the animal kingdom. Hence the small-sized, early-fatting varieties of cattle, sheep, swine, &c.

Where a plant or animal is grown or reared chiefly to be consumed as food, the application of this principle seems desirable and advantageous; but when the natural character and beauty of the plant or animal are desiderata, a more natural mode of treatment, or one more resembling that which is generally followed, is requisite for attaining the end in view.

All intricate operations of culture, such as those of the coiling system, the chambering of the roots of trees, taking up and replanting, particular modes of training, ringing, &c. it should never be forgotten either by gardeners or their employers, are only calculated for places where abundance of men are kept, and where also there is considerable skill in at least one or two of these men. When these and similar operations are attempted in places where there are scarcely hands enough to keep the garden in order by the common practices, failure is certain to attend either the new practice or the old ones, and probably both.—CONDUCTOR.

From Loudon's Magazine.

A DESCRIPTION OF A MODE OF CULTIVATING ONIONS.

By MR. WILLIAM WHIDDEN.

Sir—Your correspondent, John Mitchel, jun., treats on the culture of the onion. I write not to dissuade him from following the plans which his own observation has suggested to him, but to state my own experience on this subject, as it differs widely from his. In March, 1830, I lived as gardener to J. B. Praed, Esq. of Tyringham, Bucks; and, having occasion to make an asparagus bed, I resolved upon sowing onions, of the Deptford sort, in drills between the rows. The ground was not prepared in the way usual for asparagus, but turned over to the depth of one spade only. The soil being of a tenacious and cohesive quality, I used a quantity of coal-ashes and rotten dung: and all being in readiness for the asparagus, I proceeded to plant it in rows eighteen inches asunder, and the onions in drills between these rows. I finished each row as I proceeded, which caused a great deal of trampling, and the ground was remarkably hard after the whole was completed. When the crops began to grow, I thought of hoeing, thinning, &c.; but, being a native of Northampton, where some of the best onions in the kingdom are grown, I recollected seeing, at different times, onions growing in the hard walk, and

these the best sample of a whole acre. I accordingly resolved to let my crop take its chance. Weeding and thinning were performed by the hand, which greatly increased the solidity of the soil. My crop was pulled up without attention being paid to any particular time or form; the onions composing it were sound and good, while the crops of my neighbors were suffering from what are termed mouldy-nosed onions. I had several bushels from a small piece of ground, and was obliged to exchange with my neighbors for picklers. I presented Mr. Atkins, nurseryman, of Northampton, with twelve which weighed eleven pounds. I planted twenty-four of them the succeeding spring, for seed, which weighed nearly twenty-two pounds, and were shown to several friends before they were planted, who can testify the fact. I cannot say what quantity of seeds they produced, as I left my situation at that time.

A great deal has been said about growing large onions; but, according to my humble opinion, large onions are not the most desirable. From my experience (which, I confess, is not a lengthened one, as I am but a young gardener,) an onion from one to two inches diameter is the most profitable, of the readiest sale, and the best for gardeners and gentlemen. When a large onion goes into a gentleman's kitchen, it is cut, and a part only is used; the remainder loses its quality, and ultimately bears company with the peelings to the dung heap. I advise John Mitchel, if he wishes for large onions, to try as I have suggested above. His soil will suit every purpose. He will find an advantage in time; run no risk in displacing the roots, which is apt to check vegetation; and he will not be so likely to get disease in the crops, as the trampling forms gutters in which he can, if dry weather occur, put water, and supply the roots more gradually with moisture; or, if a continuance of rain should happen, these gutters will carry off the superfluous water.

Chicheley Hall, Bucks.

For the Farmers' Register.

TOBACCO CULTURE—NO. 4.

[Continued from p. 223, Vol. II.]

Stripping and pressing.

Stripping and pressing being the subject of my fourth number, (already too long delayed) the remarks thereon will conclude the practical part of the subject. As soon as tobacco is thoroughly cured by fire, it should be taken down, and removed to the pressing house, (which should be kept as a store house,) and crowded away on the tier poles as close as possible, to prevent its getting in "high order," as tobacco loses in weight, and changes color, every time it gets very high. As soon as the pressing house is filled, other houses should be set apart for the same purpose, until the whole crop is stowed away. Tobacco thus crowded away, is in much better condition than when hanging open, or bulked down: for it retains the color and substance which it had when cured, and is not liable to acquire a sour smell, which is very often the consequence of early bulking.

When there comes a season for stripping, the tobacco on the lowest tiers will be in order, which should be taken down and bulked; and then there will be room to open that above, which, when it comes in order, should in like manner be taken, and so on, until the whole crop is gone through. Tobacco should not be taken down in very high order to strip, as it will be impossible to strip as much, owing to the difficulty in pulling the leaves off of the stalks: and it will be impossible also to get the dirt off of it, which should always be done before it is bulked down; or else it can never be as effectually done afterwards. This is a matter of considerable importance, particularly in the management of a dirty crop.

In stripping, the tobacco should be carefully assorted into at least three classes, to wit: *long*, *short*, and *lugs*. I have usually divided it into four classes, the fourth being simply a separation of the bright from the dark. The first and second qualities should be tied up into neat bundles of about six or eight leaves, all being nearly of the same length. The lugs can be tied into much larger bundles.

As the tobacco is stripped, it should be bulked down, until a sufficiency is procured to commence pressing, when it should be re-hung in uniform and open order, and suffered to remain until it gets thoroughly dry, leaf and stem, and then the first time it comes in order to be handled without much breaking, it should be taken down and neatly bulked, and heavily weighted.

Too much caution cannot be used about the order in which tobacco is taken down for pressing. Experience has taught me that no season is to be relied on between the months of November and April, unless the wind is from the south or south-west. No matter how fine the order may appear to be, if the wind is from the north-east or north-west, let it alone, for it will certainly prove too high when it is opened in market. If any one thing is more essential than another in the management of tobacco, it is *dry order*. I have almost invariably pressed my tobacco so dry as to make it necessary to steam it a little over a fire immediately before handing it into the hogshead, in order that it may be packed without breaking, and I never had a hogshead that was said to be too dry when opened in market.

The casks should be made of well seasoned staves, about three-fourths of an inch in thickness, and should be thirty-eight inches in diameter across the heads, and fifty-four inches in length, made nearly straight. The mode of packing the tobacco in the casks is so well understood, and so universally the same, that it is deemed unnecessary to give a minute description of it. The simplest and most convenient machines for pressing, are those that are worked with a lever. The beam should not be more than twenty-two feet long, and the lever is worked in a permanent sword that passes through the end of it. Three hands can press two hogsheads in four or five days, which should each weigh about sixteen hundred pounds net.

These views on the subject of tobacco culture, are submitted with great diffidence to the intelligent planters of Virginia; and should they fail to suggest any thing new or valuable, may be the means of eliciting information from others, much more capable than myself, to give instruction in this, the most intricate and laborious of all our agricultural pursuits. The effects of tobacco culture on the agricultural interest of Virginia, will form the subject of my next number, and will complete the series promised in the commencement.

Wardsfork. G.

For the Farmers' Register.

TOBACCO CULTURE—No. 5.

On the effects of the Tobacco crop on the agricultural interests of Virginia.

From the earliest history of this country to the present moment, the tobacco crop has been one of considerable interest, not only to individuals, but to the community at large: and although it has been a great source of wealth to this community, and to the United States in general, in a commercial point of view, it has done more to blight and empoverish Virginia than all the other crops that have been the product of her once generous, but now abused and exhausted soil. The time was, when there was no difference of opinion prevailing about the propriety of making this crop. But now, it has become a question of very serious import, whether the crop should not be entirely abandoned, or at least very much diminished. Indeed, interest and sound policy at home and abroad, unite in demanding a reduction of the crop; and however slow we may be in believing it necessary, or obstinate in continuing its extensive cultivation, it does not require the spirit of prophecy to divine, that the time is not far distant when we must be driven to the dire necessity of quitting the crop, or forsaking the country. When dread alternatives like these stare us in the face, and threaten us with consequences so much to be deplored by every friend to his country, it becomes the duty of every intelligent agriculturist to forego his present gain, and do all in his power to diminish the cultivation of the crop, and to renovate our already much abused and empoverished soil. In the early settlement of Virginia, when the whole face of the country was thickly covered with almost unbroken forest, there was every inducement at home and abroad, to encourage the cultivation of tobacco; but now, the whole scene is changed —sadly changed. Two generations have not passed away since the settlement of this part of Virginia, and what do we now see! Our country mourning, and presenting the appearance of decrepitude and premature old age. Our majestic forests have fallen at the feet of the rapacious planter—our fields are lacerated with the plough of the ruthless cultivator, and our whole country presents a scene melancholy to behold. It therefore becomes us, one and all, to seek out the cause of this decay, and staunch the wounds of our beloved, and bleeding country.

In the early settlement of eastern Virginia, the tobacco crop was extensively cultivated, and continued so to be, until the country was so much cut down and exhausted, that it was no longer a subject of interest to the planter, but of manifest injury to his present and future agricultural prospects. Not until the alternatives of abandoning the crop or the country, stared the people of eastern Virginia in the face, did they determine to forsake the crop, and seek out other subjects of profit in their agricultural pursuits. So paralizing and blighting are the effects of this crop (where extensively cultivated,) upon the resources of any country, that it requires a long time for its inhabitants to accommodate their feelings, habits, and prejudices to a change so radical, and enter with spirit and energy into a system calculated to restore their exhausted lands, and retrieve their fallen fortunes. Hence it is, that we see now for the first time, the people of that favored section of country, awaking from their lethargy, and availing themselves of all the advantages so abundantly furnished by nature, for the melioration of their agricultural condition. These having been the effects of the extensive cultivation of the tobacco crop in eastern Virginia, let us see what are its effects upon the agriculture of middle Virginia —the section in which we live. To the evils already enumerated, all of which are applicable to our region, we shall add many others, to the truth of which, our experience bears ample testimony. From the excessive drudgery of the crop, it has the effect to discourage white labor, and consequently, encourage the substitution of slave labor. This has decidedly a bad effect upon the habits and morals of the white inhabitants of our country, as well as on their agricultural profits; for, whatever has a tendency to encourage idleness, increases extravagance and vice. I verily believe, that were it not for the extensive cultivation of tobacco, parents in this country would bring up their children to work on their farms, and instead of the swarms of "professional" drones and idlers that we daily see hanging upon the skirts of society, and living upon the labor of the industrious portion of the community, we would see an industrious and intelligent population, content to enjoy the profits of their own virtuous labors. It has the effect also, to increase the value and scarcity of the actual necessaries of life—to wit, corn and pork, and consequently, those articles of prime necessity have always been comparatively scarce, and high, in this part or the country. Indeed, I know many, very many intelligent and wealthy planters, who make this exhausting, troublesome, and expensive crop to buy corn and pork —thereby restricting the comforts of living, and rendering themselves dependent upon others for the very things that sound policy and good economy would require them to furnish from their own farms. For, so fully does this destructive policy enter into our domestic economy, that there is not a pig upon our plantations, that does not feel its blighting effects. It is a remarkable fact also, that when the largest crops of tobacco are made, the least profit is realized by the planters: for the abundance of the crop keeps down the price, and consequently does not repay the planter for the increased wear and tear of his land, and expense of cultivation. I am clearly of the opinion, that if the tobacco crop of middle Virginia was diminished one-half, the planters would realize more clear profit, live in far greater plenty and comfort, and at the same time, have an opportunity to improve their lands with rapidity, and make many articles with their own labor, that they now have to pay money for—and that money, made in the hardest possible way—to wit, by the tobacco crop. It is obvious to every one who looks abroad upon the face of our country, from the tide water to the mountains, that the tobacco crop has been the great agent in its destruction—and, judging the future by the past, I venture to assert, that in twenty years to come, three-fourths of the tobacco made in the United States, will be raised in the great Valley of the Mississippi. Its tendency has been west-ward ever since its earliest introduction into Virginia; it must therefore, from the nature of the case, ul-

timately centre (and that at no distant day) in that great Valley. And I for one, will hail that era as one of the brightest for the agricultural prospects of middle Virginia. Already, nearly all our best lands have been cut down, in cultivating this ruinous crop, and hence, it becomes manifest, that we cannot be, to any extent, a tobacco making people. Let us then, curtail our crops, improve our lands, husband our resources, and with the smiles of providence, and the approbation of our own consciences, we shall be a prosperous and happy people, enjoying a climate, exempt from the extremes of heat and cold, and the fruits of a soil, susceptible of as a great a variety of products as any on the habitable globe. Then, and then only, will we deserve well of posterity, and improve the talents so bountifully committed to our care.

Wardsfork, Charlotte County. G.

INQUIRIES AND REMARKS ON THE EFFECT OF EXPOSING GYPSUM TO THE WEATHER.

Valmont, Jan. 23, 1835.

To the Editor of the Farmers' Register.

I have a parcel of Plaster of Paris which has been several months exposed in hogsheads to all the vicissitudes of weather, wet and dry, hot and cold, even to freezing. It is the leavings of a plaster yard, and this not completely ground, is mostly in a sandy state with some lumps; these lumps will crumble more easily than the lumps as we first receive it. I want to know whether it has totally lost its virtue, or to what extent, by exposure; and whether in preparing it for use, it would be proper to dry it over the fire—for it is quite wet, and seems very unwilling to surrender its moisture. As lime is one of its components, I presume it has been partially slaked, and is therefore more or less weakened. I have subjected it to one test which seems to indicate that it is not entirely destroyed. By heating, and then pouring water upon it, it runs together and forms quite a hard cement. For want of pot or pearl-ash I cannot try it by boiling with that, nor have I the means of determining whether the residuum would be carbonate of lime. When plaster is scattered over the earth it is immediately liable to this slaking process, (if it may be so called) and all the effects of sun, air, and rain: and universal experience I believe attests, that it is slow and *continuing* in its action, not producing its effect by any sudden and powerful impulse. Its action is so slow, that we have a right to suppose it is going on a long time—for months or years—long after the weakening effects of weather upon it have taken place. The result of an experiment at Dover, communicated some years ago to the Agricultural Society of Richmond, proved that the effects of plaster were visible fourteen years, I think, after the plaster was applied: and that I witnessed myself. The slow operation of plaster, results from its *modus operandi*, whether as an *absorbent*, by drawing and retaining moisture around the plant, or as a *solvent*, by preparing vegetable matter for its food. The only difference then, between the application of plaster in its fresh state and in that which I have supposed, is in the point of time whilst (in the first state) the dissolving or *slaking* process occurs. Now, what is the value of that difference?

I will trouble you with another question, whilst we are upon the subject. If plaster acts merely as an *absorbent*, of what consequence is the nature of the soil, provided it is loose enough to allow the powder to descend to the roots, and not so loose as to allow it to pass below them? If as a *stimulant* in any other way, why should not a moist soil be as sensible of its effects as a dry one, provided it is not so wet as to carry off the powder? Would you advise lime or plaster in a wet piece of ground—it being presupposed that all practicable means have been used to drain it?—for I believe it may be considered an axiom in agriculture, that for whatever purpose land is intended, it must be laid as dry as possible.

If Mr. Editor, interrogatories generally betray ignorance, much more do they in this particular case—and taking to myself the *compliment* once paid to Pope, I might with propriety subscribe myself a ? But not having pride enough to hide my ignorance, I give you my proper appellative, which you will recognize to be that of an old fellow-collegian.

C. H. HARRISON.

[The foregoing inquiries proceed from one who has had far more practical experience of the use and effects of gypsum than we have gained—and if that mode of observation and of proof alone were to be the proper test, we ought to take refuge in our want of experience, and remain silent. But as most of the answers sought, must depend altogether upon the established chemical properties of the substances in question, we can scarcely err in deciding according to those properties: and the remarks which follow will be confined within such limits as will prevent our losing sight of this sure guide—without which, none will fail to wander into uncertainty and error.

The slaking of quicklime, alone, is no cause of injury, or weakening of its power—but as this process always precedes or accompanies the injury which is really caused by exposure to air, the slaking of lime is generally considered as evidence of some progress at least having been made in the lime's becoming carbonated, *effete*, or mild, or losing its peculiar qualities as *caustic* lime. The newly burnt material for lime, (as shells or limestone,) greedily attracts moisture, and by uniting chemically with water alone, it slakes, but still retains all its caustic power, which depends not on the absence of water, but upon the deprivation of carbonic acid, which the lime had lost by burning. This acid next commences re-combining with the lime, to which it is strongly attracted, and is furnished by the atmosphere, and as well as by the earth, and by plants and other matters in a state of decomposition—and this process of re-combination is greatly hastened by the lime having been slaked, and thereby exposing a far greater attracting surface. Of course, the more it is spread to the air, or to whatever will furnish carbonic acid, the more rapidly the lime loses its caustic quality, until none remains. The lime now, as carbonated or mild, may be in most cases, as valuable a manure as when quick, (as we have elsewhere endeavored to show)—but as a material for cement, and for every purpose for which its caustic state was essential, the lime is weakened and indeed destroyed, by being changed to a different chemical substance.

The general understanding of this result of the exposure of lime, extends improperly to other substances of which lime forms the base, as gypsum, which is generally considered both by dealers in the article, and by many farmers, to be altered and injured by long exposure to air, if ground, and by rain, even in the unbroken stone. To determine whether there can be any such effect we must attend to the chemical combination of gypsum, and its state before and after such kinds of exposure.

Gypsum in its natural state is composed of lime, sulphuric acid, and water, the latter being as much a part of the chemical combination as either of the other ingredients. The mutual attraction of the lime and sulphuric acid is so strong, that no separation can be produced by any thing that air or rain can present. Neither can gypsum be wasted, any more than it can be decomposed, by air alone, or by remaining dry in powder. Water dissolves a very small proportion of gypsum—about one-six hundredth part—and therefore it will be slowly wasted by solution, if exposed to wet, and the fluid be allowed to pass off. The mere wetting, without the fluid sinking or flowing from the mass, however tending to make the gypsum troublesome in using, cannot change its nature, nor affect its value as manure. From these premises it may be inferred that the gypsum saved by our correspondent, is not altered in its chemical character—nor injured, except by being rendered more inconvenient to use—and also in this respect, that the portion previously wasted by the rains, was the part most finely pulverized, softest, and therefore the most fit for immediate action as manure.

Exposing gypsum to moderate heat has no effect except to drive off the water chemically combined, as well as any accidental supply of uncombined moisture. It would seem that merely the removal of its water could scarcely affect the action of the substance as manure. We incline to this opinion—but would not confidently assert that no injury can take place in this manner. There is in this case a partial decomposition of the substance—and slight as it is, it may materially affect that fertilizing power which is in every aspect so mysterious and inexplicable. It is highly important that it should be proved by sufficient experiments whether a moderate degree of heat is injurious to the value of gypsum—for if it is not, by using heat to drive off the water chemically combined, the stone is made much more soft, and easier to pulverize for use.

These explanations may be considered by many, and even by our friend who has suggested them by his inquiries, as too simple and trite to deserve being thus formally presented; and if so, our apology is, that many who are most conversant practically with the subject, show by their course that even these feeble lights might aid their deductions.

There is no known reason, derived from the theory of its operation, why lime (whether caustic or mild) should not act profitably on land not sufficiently drained, except in this respect, that improvements of every kind must avail but little on soils suffering from redundant moisture. As to gypsum on such soils, we know nothing, except the generally received opinion that on all wet land the application is unprofitable.]

From the Horticultural Register.

ON THE CULTIVATION OF CELERY.

It appears to me that a few practical hints on the cultivation of this useful and delicious vegetable might prove interesting and serviceable to many of your readers. I beg to premise that it is a mere detail of the methods I have practised this summer, by which I have raised celery in heads of two and two and a half feet high, of which twelve to eighteen inches are blanched and tender; they are single heads, without offsets, and many four and five inches in circumference. This method has one convenience, which is, that the young plants are raised in the open ground, without glass or hot-bed.

In the beginning of May, later or earlier, as the season may indicate, dig and pulverise well about six square feet of well manured and open ground—water it very lightly, but thoroughly, with a nose on the watering-pot, early in the day, then sow your seed and water again thoroughly in the same way. Cover up this bed lightly with a double layer of Russia mat, which should be dry, and kept down at the corners with stones; the sun, striking on the mats, penetrates them, and causes a gentle moist heat to rise from the earth; this is the most favorable state of an atmosphere for the vegetation of seeds, and the celery, particularly if not fresh, is very difficult on this point; the covers should be maintained in as dry a state as possible, (after heavy rains, the upper mat might be changed,) because, if wet, considerable evaporation takes place in the night, which is always productive of cold, and would be apt to rot the tender shoot just piercing the seed; on the other hand, if dry, it prevents the escape of heat when the sun's rays have left the earth, and retains underneath sufficient warmth to prevent any check in the vegetation; in a fortnight or three weeks, according to the season, little yellow and white sprouts will appear; when these are one-quarter of an inch high, the upper cover should be removed, that there may not be too much weight on the young plants, and if the weather continues mild, in a few days afterwards, remove the other. If well watered in the beginning, it will scarcely need any further moisture during the first process; but those who practise this method will hardly be restrained from peeping under the mats once or twice during the fortnight, when, if sultry weather has prevailed, there own judgement will guide them on this head.

The second part of the method is to have another piece of ground, double the size of the former, prepared in the same way, and when the young plants are in their fourth leaf, or about two inches high, take them up and transplant them carefully into this fresh bed, about one inch asunder, first trimming the roots a little.

If well watered and weeded, by the first of July they will have attained sufficient growth to be removed into trenches, which should be prepared in an open, well exposed spot, by digging them two spades deep and two and a half feet wide, leaving three or four feet distance between the trenches; on this space is to be piled up, like a bank, the

earth taken from the trenches. Put about four inches of good manure at the bottom of each trench, and dig it in; take up the plants, and previous to putting them into the earth, trim the roots very carefully, being sure to cut off the end of the tap root, and eradicate all little shoots and radicles; where the heart joins on to the root, as these shoot up and produce that mass of small heads, seen in our markets, instead of one large, solid, handsome plant; place them about three inches distance and water well for the first week. As the plant grows, gently fill in the trench with the earth on each side, taking care not to throw in large lumps, which twist and contort the celery, and spoil its beauty; and continue earthing up until there is a bank above ground as high as the trench was deep.

I prefer digging the trenches east and west, because the bank on each side shades the young plants in July and August, from the rays of the hot sun, and in September and October, when it is desirable the celery should advance as much as possible, the southern bank, earthed up, imbibes the heat and retains it.

I believe, by covering up the trenches well with pine and savin boughs, it may be dug fresh all the winter; but I have placed mine in an upright position in the cellar, half covered with earth and kept moist—they appear to suffer but little.

I have been rather explicit, and given my reasons for each operation at the risk of being thought too prolix; but, whenever I set earnestly to cultivate a plant, I have generally found directions in books rather too vague, and here and there a link wanting in the chain, which gave me trouble to annex; those, therefore, who are well acquainted with this process, must excuse this in favor of those who are not so efficient.

I. E. T.

For the Farmers' Register.

ACCOUNT OF THE WILD RICE OF THE NORTHERN LAKES.

Essex County, Dec. 13, 1834.

Recently in reading "Flint's History and Geography of the Mississippi Valley," my attention was arrested by the account given of wild rice, and not knowing that any attempts have been made to raise it on the Atlantic coast, I here give you the account, hoping if no experiments have been made, it may be the means of inducing some to be tried.

"Wild rice, *zizania aquatica*, or *fatua avena*—by the French, *folles avoines*—by the Indians, *menomene*. It is found in the greatest abundance on the marshy margins of the northern lakes, and in the plashy waters on the upper courses of the Mississippi. It grows in those regions on a vast extent of country. It is there that the millions of migrating water fowls fatten, before they take their autumnal migration to the south. It is there, too, that the northern savages, and the Canadian traders and hunters, find their annual supplies of grain. But for this recourse, they could hardly exist. It is a tall, tubular reedy water plant, not unlike the bastard cane of the southern countries. It very accurately resembles the cane grass of the swamps and savannas on the gulf of Mexico. It springs up from waters of six or seven feet in depth, where the bottom is soft and muddy. It rises nearly as high above the water. Its leaves and spikes, though much larger, resemble those of oats, from which the French give it its name. Its culm is jointed, as large as the little finger; leaves broad, and linear; panicle more than a foot in length; the lower branches with spreading barren flowers, the upper, with fertile and erect ones. The seeds are blackish, smooth, narrow, cylindrical about three quarters of an inch long, deciduous. It is said to have been discovered in the brooks of Massachusetts. When it is intended to be preserved for grain, the spikes are bound together to preserve them from the ravages of birds and water fowls that prey upon them in immense numbers. It thus has a chance to ripen. At the season for gathering it, canoes are rowed among the grain. A blanket is spread upon them and the grain is beaten upon the blanket. It is perhaps, of all the cerealia, except maize, the most prolific. It is astonishing amidst all our eager and multiplied agricultural researches, that so little attention has been bestowed upon this interesting and valuable grain. It has scarcely been known, except by Canadian hunters and savages, that such a grain, the resource of a vast extent of country, existed. It surely ought to be ascertained if the drowned lands of the Atlantic country, and the immense marshes and stagnant lakes of the south, will grow it. It is a mistake that it is found only in the northern regions of this Valley. It grows in perfection on the lakes about Natchitoches, south of 32 degrees; and might probably be cultivated in all the climates of the Valley. Though a hardy plant, it is subject to some of the accidents that cause failure of the other grains. The grain has a long slender hull much resembling that of oats, except that it is longer and darker. In detaching this hull the Indians use a process of drying, that, probably, in most instances destroys its germinating principle. Those who have found this grain unpleasant, have perhaps, eaten it when smoked, and badly prepared. There is probably, the same difference in quality too, as in other grains. The grain that we have eaten, was as white as the common rice. Puddings made of it tasted to us like those made of sago."

I imagine it could be easily seeded on land covered by water. A few stakes could be set up to form a line; then one hand in a small boat could paddle, whilst another could seed; in this way it could be done quickly, and with as much regularity as seeding wheat or oats on high land. Should they be found not readily to sink, they could be first rolled in dry tenacious clay. The spring would probably be the best time to seed, and the more muddy the water at the time the better, as a deposite would be left which would, in a great measure, prevent the seed from being destroyed by fish.

EDMUND F. NOEL.

For the Farmers' Register.

A PRODUCTIVE KIND OF CORN, AND THE MANNER OF ITS SELECTION.

Many years ago Mr. Cooper, a gentleman well known in Jersey as an experienced practical farmer, by a publication recommended that seed corn should be gathered from strong vigorous stalks which bore two ears. I was not then engaged in agriculture, but I well recollect the publication attracted some attention, though I am in-

clined to think the experiment was not made in this part of the country. A gentleman of Talbot, some years past, whether from the recollection of Mr. Cooper's suggestion, or from his own speculations, I know not, gathered his seed corn in this way, and became convinced of the advantage. His neighbors who saw the increased product, obtained seed from him, and adopted his practice, which in time generally prevailed in Talbot, and has extended to this, and other counties of the Eastern Shore. I recollect a conversation with the late Col. Edward Lloyd on this subject: he was a man of sound judgement, and one of the best practical farmers on this shore. At that period he had not planted this corn, and having experienced in the course of his life both loss and disappointment from the representation of confident theorists and sanguine experimentalists, whose "geese grow into swans," he was in matters of this kind slow of faith; but he became convinced of its value by observation, and tested it by cultivation.

Four years ago I obtained some of this corn, which I have continued to plant since, always carefully gathering the seed according to the suggestion of Mr. Cooper, and my crops have been much increased. My experience induces me to think, that no great advantage is derived if this corn is planted in lands naturally poor, or exhausted by cultivation; but where in a state of fertility either naturally or by improvements; I think the product from this kind of corn will be more than fifteen per cent.

WILLIAM CARMICHAEL.

Wye, Eastern Shore,
Md. Jan. 22, 1835.

For the Farmers' Register.

A PROJECT FOR COVERING HOGSHEADS OF TOBACCO ON BOARD BATEAUX.

Having been for several years past somewhat familiar with the responsibilities incurred by the carriers of tobacco on the Roanoke, Appomattox and James Rivers, and the damage sustained by the dealers in the upland inspections on those streams, for the want of a secure and sufficient covering for the hogsheads, my attention has been directed with much interest to the subject of some remedy for the evil. The materials now in use for covering are various, consisting of different kinds of woollen or cotton fabric, but none of them sufficiently impervious to water, to prevent serious damage in a very violent or long continued rain. This is manifest from the exhibition which a list of tobacco from an upland inspection makes in the fall "sampling" in the city of Richmond. And where the tobacco passes through the hands of two sets of carriers, as is the case on the Roanoke and Appomattox, the loss arising from damage falls on the dealers, from an impossibility of knowing upon whom to fix it. It is therefore important that dealers should interest themselves on the subject, and endeavor to devise a plan by which their property is secured from unnecessary exposure to damage.

My plan is this: provide yourself with a stock of plank made of hickory, from a foot to thirteen inches in width, and three-fourths of an inch thick. (Other descriptions of plank might answer the purpose well, but I prescribe hickory plank, because it is essential that the material used should not be liable to split or warp from the influence of the sun and wind; and I understand from an intelligent carpenter, that the plank made of this tree is free from these defects.) Have the planks well seasoned, and let each piece be cut a few inches longer than an ordinary lawful hogshead. Six pieces of the prescribed width will be enough for one cover, making beside the joint at the top, but two joints of a side. Two straps of leather two inches wide and a foot and a half or two feet long, the kind that is generally used for wagon harness preferred, because it combines pliancy with strength. The plank must be nailed to the leather straps in the following manner: the two planks which are to cover the top of the hogshead must project one over the other like the comb of a house, and be nailed at each end to the leather straps, through the middle of the plank. (that is, midway its width,) which will make it lie better around the hogshead. The straps which attach the two top planks must be nailed on the under side. The lower edge of each top plank must be bevelled underneath about an inch, and the upper edge of each second plank must be likewise bevelled to secure a good lap of two inches. Then there must be four leather straps of the width prescribed above, and three feet long, one end of each, nailed to the two top planks respectively, a little below the nail by which the two understraps were fastened, and on the upper side of the cover. When the two second planks are fitted, as described above, they should be nailed through the middle to the strap where it passes over them, which should be about six or eight inches from each end: and so likewise the third, on each side. This will bring the covering so low that the water will drop harmless to the bottom of the boat. Usually, daubing with some tenacious clay is considered a sufficient protection for the head of the hogshead; but if more is preferred, two yards of cotton oznaburgs suspended from small nails in the top plank of each cover, will be a complete protection. After the plank and straps are prepared, the nailing together had better be done over a hogshead, whereby a better fitting of the cover to the hogshead will be secured. It appears to me that this cannot fail to answer the purpose. It is secure, substantial, convenient, and cheap. If the joints are properly fitted, and the planks properly nailed to the leather straps, it is perfectly impenetrable to rain. With tolerable care, they will last longer than the cover now in use. On the return trip they are as useful in covering any description of goods, and when not in use can be folded up in a very small compass, the leather straps to which the planks are attached, serving as hinges. Its cost cannot exceed one-half of those made of negro cotton or plains. Two hundred feet of plank, one dollar's worth of harness leather, and twenty yards of cotton oznaburgs being sufficient to make an outfit for a boat; and the cost of these articles, including the carpenter's bill, cannot exceed $10. If upon experiment, the above scheme is seen to answer a valuable purpose, I shall feel that I have rendered the commercial and planting community, an important service. If it only serves to attract to the subject more ingenious and contriving reflection than my own, I shall feel thus much good has been done. This much I well know, that the present state of things upon this subject, calls loudly for remedy.

AN UPLAND DEALER.

From the Horticultural Register.

FLORICULTURE FOR THE PARLOR-WINDOW.

The following remarks are from a sheet recently published by G. C. Barrett, and are directions for the management of bulbs and plants in the parlor; and as a little science in parlor-window Floriculture might be beneficial to practice, we here insert them.

"*Hyacinths* and other bulbs that are intended to flower in glasses, should be placed therein during October and November, and kept in a cool room. After the fibres begin to push a few shoots, the glasses may be taken to the warmest apartments to cause them to flower early. Bring a few from the coldest to the warmest every two weeks, and thus a succession of bloom may be kept up from January to March.

"Supply the bulbs with fresh water once a week, in which period they will inhale all the nutritive gas that they derive from that element, if they are in a growing state. Fill the glasses with water, so that the bottom of the bulb may just touch it.

"The water should be changed as it becomes impure; draw the roots entirely out of the glasses; rinse off the fibres in clean water, and wash the inside of the glasses well. Care should be taken that the water does not freeze, as it would not only burst the glass, but cause the fibres to decay.

"December, January and February, is the trying season for all plants that are kept in rooms, especially those that are desired to have a flourishing aspect through the winter, a few general instructions will perhaps be desirable to all those who are engaged in this interesting occupation, which forms a luxury through the retired hours of a winter season, and with very little attention, many are the beauties of vegetative nature that will be developed to the gratification of every reflecting mind.

"All the varieties of *Polyanthus Narcissus* are well adapted for indoor flowering. The Grande Monarque and Roman are charming flowers; the latter is perhaps the earliest of all bulbs; if potted in October or November, it will bloom by Christmas; the flowers are four or five in number, of a delicate satin white, with double cups of a rich jessamine perfume.

"Plants that are kept in rooms generally are such as require a medium temperature, say forty degrees. Sitting rooms or parlors, about this season, are, for the most part, heated from fifty-five to sixty-five, and very seldom has the air any admittance into these apartments, thus keeping the temperature from fifteen to twenty-five degrees higher than the nature of the plants requires, and excluding that fresh air which is requisite to support a forced vegetative principle. Therefore, as far as practicable let the plants be kept in a room adjoining to one where there is fire heat, and the intervening door can be opened when desirable. They will admit sometimes of being as low as thirty-three.

"If they be constantly kept where there is fire, let the window be opened some inches, two or three times a day, for a few minutes, thereby making the air of the apartment more congenial, both for animal and vegetable nature.

"There are very few plants killed for want of water, during winter. All that is necessary is merely to keep the soil in a moist state, that is, do not let it get so dry that you can divide the particles of earth, nor so wet that they could be beat to clay. The frequency of watering can be best regulated by the person doing it, as it depends entirely upon the size of the pot or jar in proportion to the plant, whether it is too little or too large, and the situation it stands in, whether moist or arid. Never allow any quantity of water to stand in flats or saucers except bulbs. This is too frequently practised with plants in general. Such as *Calla Æthiopica*, or African Lily, will do well, as water is its element, (like *Sagittaria* in this country;) and the *Hydrangea hortensis*, when in a growing state, will do admirably under such treatment. Many plants may do well for some time, but it being so contrary to their nature, causes premature decay; a fetid stagnation takes place at the root, the foliage becomes yellow, and the plant stunted; and in the winter season, death will ensue. Clean the foliage with sponge and water frequently, to remove all dust, &c. Turn the plants frequently, to prevent them growing to one side.

"*Camellias*, when in bud and flower, should never be allowed to become the least dry, neither confined from fresh air. The effects would be, that the buds would become stinted, dry, and drop off. Therefore to have these in perfection, attend strictly to watering. Give frequent airings, and wash the leaves once in two weeks with water. Never keep them above one day in a room, where there is a strong coal fire, and not above two days where wood is used as fuel. Most *Camellias* will bear three degrees of frost without the smallest injury, so that they are easier kept than *Geraniums*, except when they are in bloom. In that state, frost will destroy the flowers. The air of a close cellar is destruction to the buds."

From the Genesee Farmer.

BOARD FENCE SUPPORTED ABOVE GROUND.

I wish to call the attention of the public to a kind of fence mentioned by a worthy writer for the Farmer some weeks ago under the head of setting posts both sides of a fence. The posts were of plank, eighteen inches wide at the foot, and only wide enough for a cap board at the top, leaving a base of three feet to rest on the soil. This was to me an important subject, and I soon resolved on an experiment. I procured a hemlock log five feet long and twenty-six inches in diameter—it was sawed into four inch plank for end posts and two inch for middle ones—they were split so as to leave the posts sixteen inches wide at one end and six at the other—they ought to have been nineteen at one end and three at the other; but my sawyer said the log was so short that he could not cant it sufficient on his carriage. This is a difficulty however, that I think may easily be overcome. I built one length twelve feet long, with two posts, and two lengths sixteen feet long with four posts, two each side. I put five one-inch boards on each length, the bottom one was twelve inches wide, the others six inches; the cap board should be one and a quarter inches in thickness. I am well satisfied with the experiment, and though the base is not so wide as it might have been, yet it stands well, and I think it impossible for the wind to injure it. If it wants any thing, it is weight, and that can be sup-

plied without difficulty. Peeled slabs may be used instead of boards, for the posts are so narrow that the slabs can be cut to the proper thickness with an adze very easily. I have not written to exhaust the subject, but am in hopes that others will be induced to give their thoughts upon it, for I fully believe that our forests afford all that need be required for fence posts. I object to the common mode of setting posts in the ground, for the sole reason that the greatest support is required where they are the most liable to decay, and this I conceive to be unavoidable. I would invite my brother farmers to make experiments for themselves, and publish the results, for reform is loudly called for.

W. P. R.

Holland Patent, Dec. 2d, 1834.

LEGAL GRAZING, OR THE RIGHT OF COMMON.

To the Editor of the Farmers' Register.

I duly received the petition to the legislature for the water fence law confining itself to the James River and its tributary branches; but as this does not in any material way concern us, a number of signatures need not be expected. I only regret that it was not one of a different character—one, to alter the general law of enclosures. I feel safe in saying, that a memorial of this kind would receive almost universal sanction in this county—though the time has been, when it would have been scowled from among us as a lawless usurpation of the rights of the poor. But these dark days are past, and we hope, buried forever in the vortex of time, and a brighter and more auspicious morn is dawning upon us. We have been taught wisdom in the hard and chastening school of experience. We have clung eagerly to the old fabric, knowing no man as a landholder only so far as he had it enclosed with a lawful fence, until we are bankrupts in stock raising, (and I like to have said, every thing else connected with farming.) We can never arrive to eminence, or even respectability, as a stock raising counrty, as long as this legal scourge of grazing in common, exists. Though nature in her smiling moments have lavished upon us her choicest gifts—our lands carpetted with the richest green, and fed with the fattest soil, and meliorated with the most happy clime, all inviting the varied kinds of stock from more rigorous and snowy climes, but we are deterred by the melancholy experience of the past, from attempting to aspire to reputation in this all-important branch of judicious husbandry. All the helps or advantages that the legislature of Virginia can betow on the agricultural community for many years to come, would not compensate them for the losses and injury that have been sustained from this law: an unphilanthropic law, one, that is a friend to none—an enemy to the poor—a tyrant to the rich—a scourge to the industrious—a flatterer of the careless and indigent. I am glad to see the determined stand that many counties have taken to rid themselves of this hardship. As the campaign is commenced, and the banner unfurled, it only requires that we should rally to the standard; and if our representatives now sitting, still persist in turning a deaf ear to the loud calls that are now made upon them, we will feed them out of the same spoon at our next election.

A RADICAL.

Norfolk County, Va.,
Dec. 20th, 1834.

From the London Quarterly Review of Nov. 1st, 1834.

ALIMENTARY SUBSTANCES—BREAD MADE OF WOOD.

Dr. Prout has of late clearly proved that all the chief alimentary matters employed by man may be reduced to three classes, viz., saccharine, oily, and albuminous substances, the most perfect specimens of which are respectively sugar, butter, and white of egg. The saccharine principle, in its extended sense, includes all those substances which are chiefly derived from the vegetable kingdom—means, in fact, the same thing as what we commonly call vegetable diet. It comprehends all those substances, whatever their sensible properties may be, into the composition of which the hydrogen and oxygen enter in the proportion in which they form water;—for example—what perhaps may not a little surprise the reader—the fibre of wood, which chemists call *lignin*. Much skilful manipulation and delicacy of experiment were required to establish this result; but the nutritive property of the woody fibre—in short, that a tolerably good quartern loaf can be made out of a deal board—has been proved by the recent labors of a German Professor, and may be verified by any one who will take the trouble to repeat them:—

"The following (says Dr. Prout) was the method he employed for this purpose. In the first place, everything that was soluble in water was removed by frequent maceration and boiling; the wood was then reduced to a minute state of division, that is to say, not merely into fine fibres, but actual powder; and after being repeatedly subjected to the heat of an oven, was ground in the usual manner of corn. Wood thus prepared, according to the author, acquires the smell and taste of corn-flour. It is, however, never quite white, but always of a yellowish color. It also agrees with corn-flour in this respect, that it does not ferment without the addition of leaven, and in this case sour leaven of corn-flour is found to answer best. With this it makes a perfectly uniform and spongy bread; and when it is thoroughly baked, and has much crust, it has a much better taste of bread than what in times of scarcity is prepared from the bran and husks of corn. Wood-flour, also, boiled in water, forms a thick, tough, trembling jelly, like that of wheat-starch, and which is very nutritious."—*Philosophical Transactions*, 1827, *Part II. p.* 318.

To make wood-flour in perfection, according to Professor Autenrieth, the wood, after being thoroughly stripped of its bark, is to be sawed transversely into disks of about an inch in diameter. The saw-dust is to be preserved, and the disks are to be beaten to fibres in a pounding-mill. The fibres and saw-dust, mixed together, are next to be deprived of everything harsh and bitter which is soluble in water, by boiling them, where fuel is abundant, or by subjecting them for a longer time to the action of cold water, which is easily done by enclosing them in a strong sack, which they only half fill, and beating the sack with a stick, or

treading it with the feet in a rivulet. The whole is then to be completely dried, either in the sun or by fire, and repeatedly ground in a flour-mill. The ground wood is next baked into small flat cakes, with water rendered slightly mucilaginous by the addition of some decoction of linseed, mallow stalks and leaves, lime-tree bark, or any other such substance. Professor Autenrieth prefers marsh-mallow roots, of which one ounce renders eighteen quarts of water sufficiently mucilaginous, and these serve to form four pounds and a half of wood-flour into cakes. These cakes are baked until they are brown on the surface. After this they are broken to pieces, and again ground, until the flour pass through a fine boulting-cloth; and upon the fineness of the flour does its fitness to make bread depend. The flour of a *hard wood*, such as beech, requires the process of baking and grinding to be repeated. Wood-flour does not ferment so readily as wheaten-flour, but the Professor found fifteen pounds of birch-wood flour, with three pounds of sour wheat-leaven, and two pounds of wheat-flour, mixed up with eight measures of new milk, yielded thirty-six pounds of *very good bread*. The learned Professor tried the nutritious properties of wood-flour, in the first instance, upon a young dog; afterwards he fed two pigs upon it; and then, taking courage from the success of the experiment, he attacked it himself. His family party, he says, ate it in the form of gruels or soup, dumplings and pancakes, all made with as little of any other ingredient as possible; and found them palatable and quite wholesome. Are we, then, instead of looking upon a human being stretched upon a bare plank as the picture of extreme want and wretchedness, to regard him as reposing in the lap of abundance, and consider, henceforth, the common phrase 'bed and board' as compounded of synonymous terms?

The Laplanders of Tryssild, and the mountainous part of Oesterladen, are said by Von Buch, in his Travels through Norway and Lapland, in 1806—7—8, to make a bread, called by them Barke Bröd, in the following manner:—

"When the young and vigorous fir trees are felled, to the great injury of the woods, the tree is stripped of its bark for its whole length; the outer part is carefully peeled from the bark; the deeper interior covering is then shaved off, and nothing remains but the innermost rind, which is extremely soft and white. It is then hung up several days in the air to dry, and afterwards baked in an oven; it is next beat on wooden blocks, and then pounded as finely as possible in wooden vessels. But all this is not enough: the mass is yet to be carried to the mill and ground into coarse meal like barley or oats. This meal is mixed up with thrashed oat-ears, or with a few moss-seeds; and a bread of about an inch thickness is formed of this composition."—p. 87.

In another place, the same traveller, talking of the Enare Laplanders, says,—

"In summer they scarcely eat anything but fish from the fresh water lakes, and drink with great eagerness the water in which the fish has been boiled. In winter they must put up with dried fish, and with soups of water, fir bark, and rein-deer tallow. They peel off, in summer, the innermost bark of the fir, divide it in long strips, and hang them in their dwellings to dry for winter stores. When used, these strips of bark are minced in small pieces along with the rein-deer tallow, and boiled together for several hours with water, till they form a thick broth."—p. 324.

It is not improbable, says Dr. Prout, when speaking of this method, that during the above processes the lignin combines with water, and forms an artificial starch; what the change may be we will not venture to decide. As for the spongy bread made by the Tubingen Professor, we should like very much to taste it; but with respect to the poor Laplander's coarse and husky variety of *the staff of life*, it can be, we greatly fear, little better than the newly-invented patent bread of our own metropolis.

One word on this new-fangled article. It is well known that in the old established way of baking, the steam which arises during the process is allowed to escape as of no value; but accident discovered, a few years ago, that this vapor, if condensed, exhibited traces of alcohol, and the collection of it immediately became an object of cupidity and speculation; and this, together with some saving of fuel during the process of baking, suggested the patent and the formation of the company upon a great scale. One of its recommendations was, that bread so made, though kept for any length of time, does not become sour; and this we understand is the fact; but how and at what expense is this incorruptibility procured? Sour bread is unquestionably bad; but is not bread which, if kept too long, is liable to become sour, the very article we want? In the new method, the distillation (for such it is in reality) is pushed as far as it can go: the whole product of the fermentation is obtained and collected, so that the residue, or loaf, may be regarded as a *caput mortuum*, incapable of undergoing further change; but is it not rather unluckily deprived, at the same time, of its saccharine principle—in short, of all nutritive property? For our own parts, we adhere to the old orthodox 'bread with the gin in it.'

THE WAY TO BUILD STONE FENCES—SOWING ASHES WITH GYPSUM.

Madison County, (Va.) Jan. 21st, 1835.

To the Editor of the Farmers' Register.

I noticed in your January No. of the Farmers' Register, information asked for, by "A Querist," respecting the best mode of making stone fencing. Having had some experience in this operation, I will endeavor to describe my mode. The material which I use is round river stone—of all, the most difficult to make stand. The stone wall or fence, when built (on a level surface) is 4½ feet high, 4 feet wide at the base and the sides drawn in regularly as they rise. The proper form is preserved easily and correctly, by making use of the frame which will be now described. Two planks, each 7 feet 10 inches in length, 9 or 10 inches wide, and 1½ inches thick, are coupled together like the rafters of a house, or so as to be something like the letter A, but presenting other proportions. The two planks, (represented by the sides of the A,) are united at the top by the sides of the ends—and the other ends, or feet, are spread open so as to be 4 feet apart, and are secured at that distance by a horizontal cross piece, or collar beam, as it may be called, which is made of scantling, and is to be at 4½ feet, perpendicular dis-

tance, above a line drawn from one to the other of the spread ends of the planks. The space below the collar beam, is the size of a section of the wall, and is used as a measure to preserve that size. Another pair of similar planks are put together in precisely the same manner—and then these two corresponding parts, or ends, are united by a piece of scantling 15 feet long, which runs from the middle of one collar beam to the middle of the other. When thus united, the two rafter shaped ends of the frame should stand upright on their feet, and be parallel to each other. Two side planks 12 inches wide, and as long as the whole frame, are then laid outside of, and lying against the spread legs of the frame. These planks are to direct the placing of the stones for the sides of the wall. They are kept close to the legs of the frame, by other pieces of plank which are attached outside of, and parallel to each of the legs, and separated from them 1½ inches by small blocks. The long side planks may be raised or lowered, and yet are kept in place by these outer pieces—and by holes and pins, are fastened at any desired height.

The frame is used by being placed over the line of the intended fence, the side planks being then at bottom, and equally distant from the central line of the foundation of the wall. I first haul my rock in place in a line parallel with the foundation of my fence. The frame is then moved in place where the fence is to commence, the two side planks resting upon the ground. Two laborers, one on each side, place the rock, carefully touching the side planks from one end to the other, whilst others are employed throwing in rock in the intermediate space, without being particular in placing them, from which the two hands before mentioned select such rock as is most suitable for the case of the wall: for if this is put up judiciously, it matters not how the inner stones are placed. When the rock is upon a level with your side planks, take out the pins which fasten the side planks, and slip them one hole higher; then proceed to place the rock as before, continuing to move your side planks as the rock is level with the upper edge, until your wall touches the scantling. Then, with a man at each foot of the frame lift it up a foot or two, and move it forward. In this way I have had from thirty to thirty-five yards of fencing made in a day by ten or twelve hands. I would here mention that the hands employed in filling up, or throwing in rock, do it with hand barrows—which enables them to do it much more expeditiously than by hand. I build my fence upon the surface of the ground, without digging a ditch, in consequence of having a stony foundation on the margin of the river. I think there would be no necessity for digging a ditch where the fence is on level ground, though not stony: but I think it would be necessary where the ground slopes, as the action of the frost would be apt to undermine the lower side of the wall. I should judge that four inches would be sufficiently deep for the foundation. It has been several years since I commenced stone fencing, not a foot of which has fallen. At the end of the wall or fence where I have a gate, I procure, if practicable, square stone to put in; as the round stone if put up perpendicular is apt to give way.

In answer to the second query, I have to say that I have been in the habit of mixing ashes with my plaster, in equal parts, and sowing after being mixed, the same quantity by measure as I usually sowed of plaster alone. I have found equal benefit from the ashes and plaster as from the plaster alone, which is a saving of fifty per cent. in plaster. I prefer the ashes damp: this will enable you to sow with more regularity, and in moderately windy weather.

C.

ON THE EFFECTS OF GATHERING FODDER ON CORN—REAPING WHEAT GREEN.

To the Editor of the Farmers' Register.

Prince Edward, 24th January, 1835.

The subject of stripping Indian corn blades and topping the corn, as practised generally in this part of Virginia, having been noticed several times in the Farmers' Register, it has occurred to me, that it may not be improper to add my experience on the subject. I have for many years been satisfied that it is very unprofitable management. Though I practise it, with a view of supplying a sufficient quantity of fodder for my stock, I am constrained to acknowledge, that it is nothing but sheer negligence in providing other means of supplying fodder or hay, that induces me to do so from year to year. I will give you as nearly as my memory serves, the result of an experiment made by me when a lad, under the special direction of my father, who made a record of this experiment, as well as of a great many others, which would now probably be very useful, but which were all lost or destroyed by his servants, during the latter declining years of his life. I cannot pretend to remember accurately the quantities of corn and fodder produced in the experiment which was made more than thirty years ago, and is nearly as follows:

Thirty-nine rows of corn, 60 hills long, 5½ feet each way, and two stalks in each hill, were planted on tolerably good land, and cultivated as common, till it was thought the proper time for pulling fodder. I then carefully pulled the fodder off of each first and second row alternately through the piece, leaving each third row to stand with all the fodder and tops on, till perfectly dry. When it was thought the proper time, I cut the tops off of each first row, so that there were 13 rows of corn with fodder pulled and tops cut, 13 rows with fodder pulled off to one blade above the ear and tops left till dry, and 13 rows from which neither fodder nor tops were taken at all. Each parcel of fodder was cured and kept apart from the other, and the blades were stripped from the tops of each first row, at the time of cutting the tops; and when cured, put with the fodder that had been pulled from the same rows. Each parcel of corn was gathered, and when perfectly dry, shelled and weighed separately, and the fodder from the 13 first rows, and that from the 13 second rows, each weighed separately. The quantity of corn raised from the 13 first rows, from which the fodder was pulled and the tops cut, was considerably less than that raised on the 13 second rows, from which the fodder was pulled and the tops left standing till dry, and still much less than the corn raised on the 13 third rows, on which both fodder and tops were left till perfectly dry. The quantity of corn raised on the 13 third rows, weighed a few ounces more than the corn and fodder both together,

which was raised on the 13 second rows, from which the fodder only was pulled, and tops left standing—and weighed a few ounces less than the corn and fodder, with the addition of the fodder stripped from the tops, raised on the 13 first rows, from which the fodder was pulled and tops cut. I remember the conclusions to which my father and myself came were, that the whole produce in in each case, was so nearly of equal value, as to make scarcely an object worth consideration, even in a large crop, and that the whole labor of gathering and curing the fodder and tops (a considerable item in a farmer's account by the by) was entirely lost.

Another experiment which I made about the same time, (of which I have not as perfect recollection) was to strip the fodder from a number of rows of corn, quite from bottom to top, taking off all the blades at the usual time of pulling blade fodder [from below the ears.] My recollection of this experiment is, that this last is the most unprofitable management of any that I have mentioned in this communication—not being practically acquainted with any other modes of managing the corn crop with a view to saving the fodder.

I will suggest to your readers, the propriety of extending the experiments so as to test the relative profit of cutting down the corn, fodder and all, just before the fodder would die and dry up on the stalks; or rather at the time of pulling fodder. Those who have secured corn and fodder in this way, generally approve the practice, but I have not seen that any person has made a fair experiment by actual weight and measure, which is the only way to avoid delusion.

It now occurs to me, that I once made an experiment on wheat, that bears some analogy to this practice. In a large field, two adjoining squares were accurately laid off to the same size, where the wheat on both squares was supposed to be equally good. One square was reaped with a sickle, about three days before ripe, the time is not certainly remembered, when the grain had just attained the dough state, and dryed and secured separately. The other square was left to get full ripe, when it was reaped as the first, in the morning whilst moist with dew, to avoid shattering—I do not think a single head was lost in either square. When both were perfectly dry, they were each very carefully thrashed, cleaned, and weighed separately. The parcel which had stood to get fully ripe, weighed so much more as perfectly to astonish me. The result was stated to my father, who said he had tried the same experiment several times with wheat, and once with barley, and it had always turned out much in the same way—but on carefully picking up all the heads of wheat that were left on the ground, upon an adjoining square which had been well mown and got in as common, we supposed that rather more good wheat would generally be housed by cutting when fully in the dough state, than by suffering it to get fully ripe, when it would inevitably shatter and scatter more than in the dough state.

CHARLES WOODSON.

[The foregoing experiment on corn and fodder, is precisely of the kind that is wanting to decide this and many other controverted points in agricultural practice—and which, when sufficiently varied and repeated, will serve better to remove doubts, and establish valuable truths, than an hundred times as much space occupied by general reasoning, and deductions from untried, and therefore doubtful premises. This experiment is only deficient in one respect—the long time which has passed since the facts were observed and recorded. But though this lapse of time lessens the force of the result, by permitting doubts to rise of something having been forgotten, such doubts are in some measure counteracted by the internal evidence of accurate and particular observation, which the manner of Mr. Woodson's statements carries with them. But even if this experiment had been recently made, and was free from every objection on the score of accuracy, it would need confirmation (as in all other cases) by other experiments made for the same object, and by different persons, and under various circumstances. It is to be hoped, that even if none of our agricultural societies will promote the institution of regular courses of experiments on doubtful points, that enough individual farmers will make experiments on the effects and cost of gathering fodder during the next season, as to settle this most important question. If the absolute loss of labor in this usual and long prevailing practice of Virginia is as great as we have supposed, and even half as great as may be inferred from the result of the experiment above, the amount of the whole annual loss and tax so paid, if saved, would be enough to defray the cost of constructing all of the canals and railways now in progress in the state, and the expenses of the General Assembly to boot.

The experiment on reaping wheat green, (or in the dough state) though less accurately observed, and reported in still more general terms, agrees in the main with our own opinions founded on the practice of reaping green for about twelve years. We have never made any one accurate experiment on this matter—and should not have supposed the difference to be near so great as is stated in general terms above: but the conclusion reached and acted upon, was the same as that which seems to be supported by Mr. Woodson's experiment, viz. that however great may be the loss from the shrinkage of the grain when reaped green, there is much greater loss, on the average, from waste by permitting wheat to stand until ripe.]

GENERAL RESULTS OF THE LAW OF ENCLOSURES IN VIRGINIA.

In every country, and in every age, there have been found existing some preferences given by government to the employment of particular kinds of capital, or of industry, at the expense of others: and however unwise, or unjust, may have been these legal preferences, they have, at least, rarely failed to produce their first and immediate object of an increased production of the commodities thus favored, or greatly increased profits to those persons engaged in the business—and more generally, both these ends have been more or less obtained. But if after a full trial of such legal preference to any particular branch of production, for many years, it should appear that both the amount of the production and its net profits had actually decreased, then (it might be supposed that) the condemnation of the legal policy might be safely left to the persons intended by

it to be favored, or to the most thorough opposers of the principles of free trade and industry in general.

The law of enclosures and its effects, exhibit a striking example of the long continued operation of the preference given by our law to the business of cattle raising, at the expense of grain raising—of a preference of grazing, to tillage. If then the policy is of any value to even the favored class, whatever evils it may produce, there should certainly be seen this one good—increased products from live stock, and increased profits to the owners. Upon this issue, we are content to test the value of this part of the policy of Virginia, and to abide by the decision, even on this partial and limited view of the subject.

Virginia is not the only country in which the interests of tillage have been sacrificed to those (real or supposed) of pasturage: but generally, the effects have been beneficial to the business and the persons so favored, however injurious to other classes, and to the general interests of the country. Here, we are content to reap all the evils of this kind of policy, without deriving any of the benefits found elsewhere from such a departure from right and justice.

In the highlands of Scotland, owing to the peculiar circumstances of the country, the profits of sheep raising have been found to surpass all other returns of agriculture. The consequence has been, that tillage has been made to give place to pasturage. Thousands of small farms, formerly held by tenants tilling the soil, have been thrown together and converted to extensive sheep pastures, in which no human population remains save a few shepherds, and scarcely a single cottage, where there were formerly hamlets and villages, filled with numerous hardy laborers, with their wives and children. The sheep have eaten out the men. This state of things has served to drive from their homes, and compel the emigration of a people the most devotedly attached to their native land, and who would have preferred any fate short of starvation in their own beloved country, to banishment from its shores forever But in thus exchanging a population of men for flocks of sheep, (however the change may be deplored by the philanthropist and patriot) there has at least been obtained the *gain* expected in wool and mutton.

In Ireland, where tythes are levied upon every product of tillage, and of the small land occupier who is necessarily a tiller of the soil, the products of grass land and live stock, have been kept free from this oppressive burden. The effect of this unjust exemption, (unjust if the nation is to bear the burden at all) has been, of course, to direct an undue proportion of land and capital to the raising of cattle. But though the effect of this state of things, is to keep out of tillage (the more profitable use, but for this exemption,) a vast extent of rich land—to increase the sufferings and the discontents of the oppressed and brutalized peasantry—still the expected gain is found to the graziers in large products of cattle, and large annual exports of beef, butter and cheese.

In Spain, the interests of the owners of pastures, as well as arable land, have for centuries been sacrificed to the established policy of the *mesta*, of which an account has been given in our last number. But though in this policy, as strange as it is unjust, the interests of tillage and even of resident stock-owners are sacrificed, to advance those of the owners of the migratory flocks—and though the general interests and public prosperity have been greatly impaired by this destruction of private rights—still the owners of the wandering merino sheep at least were fattened by the spoil, and their business prospered while all others suffered. If Spain remained poor, its soil untilled, the country but half populated—yet there was some little compensation found in the facts, that the policy which caused these evils also served to preserve the most numerous and valuable flocks, and to produce the finest wool in Europe.

Where, in Virginia, is the gain or advantage, private or public, to compensate in the least for the interests of tillage, and the rights of landed property, having been sacrificed to the interests of grazing, and the benefit of stock owners? The whole soil of the state is rendered by law a grazing common, for the use of every one, unless when secured by a "lawful enclosure," of enormous and useless expense, and which after all, can never be made a practical safeguard against trespassers. The cost of this policy to the owners and tillers of the soil, has been already and frequently discussed in this work, and is not now under consideration. The present question before us is, *what do the stock owners gain from the use of their legal privileges?* Let the general and notorious results speak in answer.

In the eastern half of Virginia, where the oppression of this system is most severely felt by land owners, there is not, and has not been for many years, any surplus product whatever derived from the grazing of live stock of any kind. So far from exporting any such commodities, we buy from other states very large quantities of salted meat, butter, cheese, leather, candles, and soap. The supplies of hogs and fat oxen brought annually from the west in droves are enormous, and have long been increasing—and most of our horses and mules are now obtained in like manner. It is a fact also worth notice, that the hogs thus driven to us 500 miles, are generally raised in clover fields, or within the farms and on the means of their respective owners, and not by the benefit of the "wood, range," or grazing in common, held so essential in Virginia. We also buy barrelled pork from New England, where the hogs are generally kept altogether in sties, and had no benefit whatever from grazing, or running at large.

It is unnecessary to carry these notorious facts more into detail. Every one knows the general truth, and has some idea of the magnitude of our import trade in live stock and their products, and that this trade has commenced, and has been regularly increasing to its present enormous amount, under the operation of our law of enclosures, and the preference it gives to stock raising. If then the system has brought so little benefit to the kind of property and its owners which it was specially intended to favor, and is still supposed to favor, we ask where are the benefits to be found, which are paid for so dearly by land holders, and by the general interests?

From the Cultivator.

SINGULAR APPLICATION OF GRAFTING.

New-Paltz, Nov. 3d, 1834.

Sir—I have a very valuable apple tree which had the bark eaten off a few inches above the ground, by mice, in the winter, and I took the following method to save the tree. I took four small twigs from another tree, and engrafted them below the wound, in the manner of side grafting, and loosening the bark above, bent the twigs and slipt them under the bark until they came parallel with the body, then covered them well by banking the dirt above the wound and grafts. I left the earth around one season, then cleared it away, and found two had taken. These have commenced to form new bodies, and the tree, from all appearances, is as thrifty as ever, and the twigs have grown in two years to the bigness of your thumb.

I am, dear sir, your humble servant,

ABRAHAM STEEN.

J. Buel, Esq.

ON THE CONDITION OF FARMERS ON POOR LANDS.

To the Editor of the Farmers' Register.

Caroline County, Va., January 21, 1835.

I have much more to say to you than I have ability to dictate, or time to write. I do not know that I should ever have troubled you with a letter, but finding (however I may applaud the value of your work) that you have not as yet fully reached my case, I cannot think of suffering you to go on, without once throwing in my plea, and, as I verily believe, that of the greater part of the farmers in my neighborhood. I am fully aware, sir, that it would be the height of folly to expect efficient aid from you or any other person, without fully stating our case, however deplorable, however humiliating. I must confess, when I read the communications of Mr. ———, Mr. ———, Mr. ———, &c., who tell us of their systems, of their farms, of their thousands of bushels of corn and of wheat, and their tons of hogsheads of tobacco—of their horses and oxen, of their wagons and carts—I am almost ready to conceal *our* poverty and wretchedness. But, sir, in our case, poverty has overcome pride; and I hope those gentlemen, as well as yourself, will rather pity than laugh at our condition.

When I was a small boy, more than thirty years ago, the three-shift system, so called, was generally pursued—small "half-shares" were the ploughs—large stocks of cattle, sheep and hogs—corn and wheat were the crops, and a manured lot for tobacco, and another for cotton. The land being clean grazed, the half-share answered the purpose of listing, and ploughing through the season. The land was laid off both ways from four feet to five and a half each way—the land was generally laid off with a view to facility of ploughing, rather than a regard to prevent its washing away by rains. It was necessary to run the plough from five to seven times to complete the row. So soon as the ploughs got over, they were turned about and the whole field cross-ploughed—and so again and again, until the crop was so far advanced as to require no more ploughing, which was generally after the silking of the corn was completed. I do not recollect whether the wheat was seeded and ploughed in with the last ploughing of the corn. If I do not, I was informed this had been the case, before the Hessian fly began to injure the wheat crop. All the manure that was raised, was from the stables, and this I can assure you was "prime;" no more litter having been thrown into the stables than was necessary to keep some of the horses from being filthy. This manure was put on the tobacco ground, and in the garden. Corn sold from $1 75 to $2 per barrel, wheat at about $1 per bushel. Orchards then were much attended to by many—apple and peach brandy were sold out to tavern keepers by the barrel; and retailed in the neighborhood by the gallon, or less, at $1 per gallon. If it be not best to let it be buried in oblivion, I will here remark, that not long since, I was riding alone and reflecting on the past scenes of my life, and I recollected some fifteen, or more, men, the yeomanry of the country, since dead, who were all much addicted to strong drink, and the greater part of whom either died from drink directly, or, as I believe, indirectly.

To proceed: under the system of agriculture above described, the lands which were (I may say compared with much) originally poor, were (most of them at least) reduced to sterility. Many of the hill-sides bordering on creeks or rivers, naturally the best land, were gullied, and past cultivation. As the crops were reduced, the families white and black increased, and the farmer was then compelled to purchase more land, or hire out his negroes, or sell one occasionally to feed the rest. I recollect a profane old gentleman, who was in the habit of selling a negro every year or two, to pay off his scores for corn and meat, who had a large number of slaves, swearing that his negroes should never eat him, but one the other. In this state of affairs, emigration to the west became very common. The man who had a small farm and a large family, whether with or without slaves, who had not been industrious and economical, was the first to feel the pressure, and off he went. His more frugal neighbor, or neighbors, purchased his land, which though poor, afforded a larger field for cultivation, and at least for a time, helped to sustain him who purchased it. In this way things progressed from bad to worse. Our state having reared a large and healthy population no longer able to subsist within her borders, was now losing them with great rapidity. This melancholy spectacle no doubt bore heavily upon the mind of our countryman Col. John Taylor, the sagacious patriot, the unyielding republican, and industrious farmer. Until he, *Arator*, wrote, all here was chaos as to agriculture. He first opened the eyes of many in this part of the country, to see that agriculture ought to, and did embrace more than simply cutting down trees, grubbing and ploughing land. He informed them that there should be system in the management of slaves, of overseers, of enclosing, manuring, labor; in cultivating Indian corn, in ploughing, in the management of all kinds of stock, in fencing, in draining, and many other things too tedious to mention. He, too, recommended, as originating with a gentleman of Albemarle, horizontal ploughing, which though not carried to the perfection recommended in the first volume of your Register by Mr. Bruce, (may his

memory be dear to us,) yet it gave the reflecting farmer great aid in preventing his best lands from washing away.

By this time, sir, you no doubt begin to think, that I shall never finish my preamble, nor state our case—but I will. I was always fond of farming. After reading Arator, I built many castles in the air—I thought if I had a farm, how soon would I make it rich, by deep ploughing, non-grazing, clovering and plastering. It was not long before I bought one, and poor enough it was—originally poor, and much worn. I ploughed it deep and beautifully—horizontally too when necessary. I cultivated my corn according to Arator's plan. I cut off my corn-stalks; had even a *farm-pen*, all my stalks and coarse litter were thrown in it and trampled. It was hauled out in the spring; ploughed in, &c. &c. I seeded my wheat nicely, though not always in single beds, (as he directed)—I clovered the wheat land, or rather I sowed the land in February with clover seed—I plastered some of it: I also plastered some of my corn, and some vegetables in my garden—and what was the result of my plastering? I have never been able, on that land, to discover any beneficial effect from gypsum. I discontinued the gypsum. I found my clover grew pretty well without it on the richest spots, and it either died or was too scattering and small to be of any service on the poorest. I have been going on for something like eighteen years, ploughing well, clovering the best spots, making what manure I could, spreading and ploughing it in, making wheat on the best land, oats on the more indifferent, not grazing except a little on spots in the fall. All this has been done at great expense: the plantation has never any thing like supported me; I have purchased corn and meat every year, and sold but little wheat. I have made no tobacco—and the most I can now say of the farm is, that it *looks as if it were in an improving state*—and I think it has improved a *little*, but very little, except where I have actually *manured* it. I pursued the three-shift system under the above regulations. You may be ready to ask, why did I not pursue the four-shift system? I will answer: at first I had not land enough—and again, even under the three-shift, I found in the bottoms, the running brier, and almost every where the sassafras, formidable obstructions to the plough. You may say, from the statement I have given of my situation, and—I believe there are a great many others in my district of country, whose land is as poor as my own—how is it possible that they can live; how can they buy corn and meat, &c., every year? I must be candid and say, my *dependence* was not upon the cultivation of the soil altogether: my profession required more horses than the farm absolutely demanded, and perhaps I kept more than were needful. Horses you know are the heaviest charge on a plantation. Possibly, had I reduced my horses, my living, &c. &c., to a certain standard, I might have made out to live upon my plantation. How then could I have made these expensive experiments? I hope now, sir, you will begin to see the difficulties a poor land farmer has to contend with, in improving his farm, and living tolerably well. In the first place, it will take about one-third of a large poor tract of land, to produce enough corn for his support, and for the production of wheat enough to purchase all necessaries, and pay taxes, &c., even with the addition of what little money may be raised by the sale of a hogshead or two of tobacco. A man with a large family, especially of children, must have milk and butter, as well as bacon—and for this purpose, he must have pretty good grazing. When I ask one of my poor land farmers, why do you not divide your land into *four-shifts*, and try to improve it? His answer is, "bless you, sir, I can hardly make out to live with *three;* I must make out the best I can to raise my children, and give them what education I can, and then they must scuffle as I have done." Can you not plainly see, sir, what is to be the result? The children must begin under the most discouraging circumstances: poverty must be their doom, or they must emigrate to the rich lands of the west.

You may say I have stated extreme cases—surely this cannot be the case generally! Truly I have stated extreme cases, and many such there are: would to God there were not so many. Virginia, sir, is *descending* to a crisis; there is a point below which she will not, she cannot fall. It requires not only your Farmers' Register, with the aid of all your intelligent correspondents—it requires also legislatures of wise, of thoughtful, of practical, of feeling men, who have her interest deeply at heart, to stay her downward course. How many are ignorant of the existence of your valuable periodical? How many are there who *could not read* it if they would? So ineffectual, as yet, has been her system of education for the poor. What has she been doing this twenty years past to lighten or abolish direct taxation? Shall the treasury be forever supplied by draughts upon *poor land farmers*, when their means are more scanty now than they were ten or fifteen years ago, when they seem, as yet, to be yearly becoming more so? What a vast amount of taxable property has in the last five years been removed to the west! How much more will be removed in the five to come, who can tell?

Perhaps, sir, my ignorance may make me bolder. I will ask further, why does she grant charters to individuals for banking institutions, for a pitiful bonus? Why not have a state bank, if any? Why grant charters to rail road and canal companies? Why not project them, construct and let them be the property of the state? How long shall our ears be accosted in election speeches, in county court yards, "hold fast your purse strings; take care of the treasury," &c. &c., as if judicious investments must lead to poverty, or that misers only became rich. To say that the location of this state is not suitable for profitable improvements, is to deny what the first glance of a map will show us.

But I have run from my subject, and that was to call your attention to the difficulties which you have to encounter, in promoting the improvement of all classes in this great state of Virginia; to beg you at least to give us a *start*—here lies the great difficulty—many, very many, of these poor land farmers are industrious men, (when I say poor land, I mean land naturally poor) they would (could they be fully convinced that any system would succeed in improving their lands) go to some expense and inconvenience, at first, to accomplish an end so desirable. They tell us too, "*if I had money* I could do so and so." If I tell them of Mr. Hill Carter, of Mr. Selden, of Mr.

Rogers, &c. &c., they say, "aye they have rich lands, they are wealthy"—my mouth is shut, and I am constrained to acknowledge the truth. If you will take a ride through some of the middle counties of this state, and see the vast quantity of poor land, and even after all the emigration how thickly settled it yet is—know their names—examine our sheriffs' books, and see what a vast amount of taxation is paid by these poor land farmers, out of their hard earnings and savings, you will begin to think that we claim a great share of your attention.

My paper admonishes me to draw to a close; you will discover I have been more intent upon bringing the outlines of our condition before you in a crude manner, than polishing with a critic's pen.

T. B. A.

[The foregoing statement of the writer's experience and disappointment in the attempt to enrich a soil naturally poor, is an apt illustration and striking testimony of the truth of the positions maintained in the *Essay on Calcareous Manures*, viz: that soils of that kind cannot be enriched above the measure of their natural fertility, by vegetable and other putrescent manures, without making use also of calcareous manures, the want of which latter ingredient is the sole cause of the unimprovable nature of these soils. There are but few persons who have long labored to improve poor soils, who will be as frank in confession as our correspondent—and there are not many, having that sanguine temperament which is essential to make zealous "improving" farmers, who can be induced to believe that their past efforts have been thrown away, and that there is no hope from persisting in similar attempts. But if these objections did not serve to keep them silent, there would be hundreds who would make statements of general failure and long continued disappointments, not less marked than those given above. If T. B. A. could have applied marl or lime to his land, he would have thereby cured its natural defects —and his other materials for improvement, vegetable matter, clover, and gypsum, would have become available, efficient, and profitable.

We are aware that this doctrine is so unpalatable to many, that it has to expect but small favor, or scarcely serious consideration—and indeed its being even uttered here, may be deemed a sort of treason to the cause of agriculture—to the progress of general fertilization, which almost all the addresses to agricultural societies, and essays on agriculture in general, concur in declaring to be easy, sure, and profitable. We at one time held the same opinion—and it was with painful reluctance, and not until after years of mispent and lost labor, that we became satisfied of the error of expecting to enrich such soils as are naturally poor, with profit or durability, by vegetable matter, or putrescent manures alone. If T. B. A. had (on such soil) practiced the milder four-shift rotation, and had prevented all grazing, his success would have been not much greater—perhaps less, if estimating the greater cost. We know of two different experiments, carefully conducted, which show by the measurement of the corn produced in each rotation, that almost no increase has been found in a course of near twenty years, during which the land had been under very gentle tillage, and secured entirely from being grazed. In one of these experiments, where the four-shift rotation of *Arator* has been strictly preserved since 1815, there has been an actual and considerable lessening of the product, as tested by the crops of four successive rotations. It should be stated, that this diminution is supposed to have been caused by the ploughing having been too deep (six inches) for so shallow a soil—but it was not so deep as was advised by *Arator*, nor as deep as was found safe and beneficial on adjoining land, after it had been made calcareous.

Our doctrine may perhaps be met (as it frequently has been) by the objection, that it sentences to hopeless sterility all lands naturally poor, and which have not command of lime or other calcareous manures. This may be an important and lamentable fact, but it is not an argument against our position, but the reverse. If a farmer owns poor land so unfortunately constituted and situated, that no considerable or profitable improvement can be made on it, the sooner he is convinced of the truth the better, that he may cease to labor for unattainable objects, and direct his energies where their exercise will be amply rewarded. If half the expense which has been thrown away in such fruitless efforts at fertilization, even in the last twenty years, had been given to the judicious application of calcareous manures, there would be now a vast difference in the aspect of Eastern Virginia, and of the amount of profit gained by every individual concerned in these different practices.]

From the London Quarterly Review of Nov. 1st, 1834.

HORTICULTURAL CURIOSITIES OF JAPAN.

If we assume the perfection of the arts of tillage and manufacture as a test of civilization, Japan may at least compete with any oriental nation. Mr. Meylan places it higher than any. He extols their field cultivation, but they appear to neglect their great opportunities for horticulture, as far as the kitchen and the dessert are concerned. As florists they are conspicuous, and the beauty of the productions of the soil in this department is known to every possessor of a greenhouse and proprietor of a camelia. The singular art of producing miniature samples of the larger products of vegetation, unknown, we believe, in Europe, is practised by them to an extraordinary degree. Mr. Meylan speaks as an eye-witness of a box offered for sale to the Dutch governor, three inches long by one wide, in which were flourishing a fir-tree, a bamboo, and a plum-tree, the latter in blossom. The price demanded was twelve hundred florins.

From the New York Farmer.

LOUBAT'S VINEYARD.

This vineyard, on which a large amount of money has been expended in foreign vines, was recently sold for the purpose of being divided into lots for cottage residences. It is six miles from Brooklyn, lying on New York Bay. There are upwards of 40 acres, which were sold for $15,300. The vines were, we presume, considered of little or no account, and thus has ended the last extensive experiment in attempting to acclimate the foreign vine in this country.

From the Complete Grazier.

FIGURES AND DESCRIPTIONS OF LORD SOMERVILLE'S DRAG-CART.

[The marks referred to in the following description as accompanying the cuts, but which do not there appear, were also omitted in the original engraving from which this was copied. The error however is not so important as to prevent the figures being perfectly understood by every reader.]

Fig. 1.

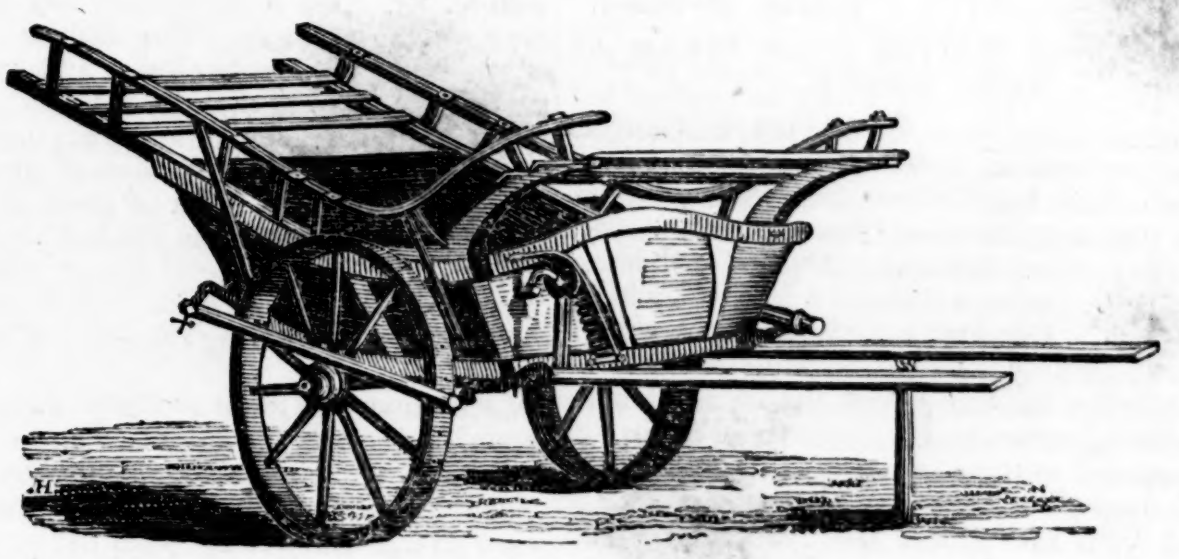
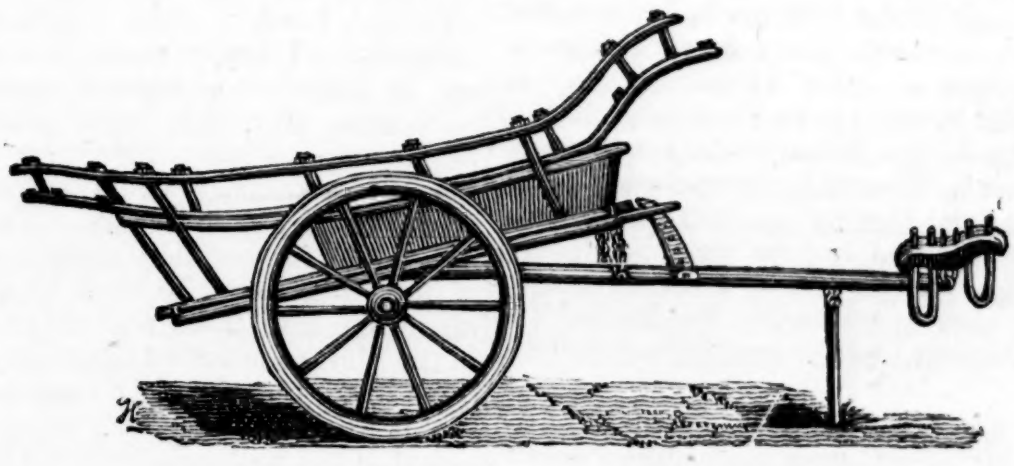


Fig. 2.



The cut above, Fig. 1. represents a front view of a *drag-cart*, invented by Lord Somerville; selected from Vol. II. of "Communications to the Board of Agriculture."—Fig. 1. is a cart calculated for draught, by a *single* horse in shafts; *b b* is a *friction-bar*, or drag, that is fixed behind by a chain, and before by a tooth-rack, delineated at *b d*, which catches on a staple, and by means of which the pressure may be regulated by the driver, according to the steepness of the descent. *c* is a toothed rack, fixed in the front of the cart, for regulating the position or centre of gravity of the load. In this figure, the friction-drag is placed lower on the wheel than Lord Somerville originally intended, in order to divide the pressure and friction more equally on the opposite side of the wheel: thus the action on each is diminished, and the risk of over-heating and destroying the friction-bar is rendered less than if the whole pressure were applied in one point at the top of the wheel.

Fig. 2. represents a side view of the same *drag-cart*, designed to be drawn by two strong oxen, with a pole yoke, and bows, the friction-bar being removed. In this figure, a more simple mode is adopted for regulating the position or centre of gravity of the load, as described at *a b* by the curved iron, perforated with holes for receiving a pin, to keep it at any required height: *c* is a small chain to prevent the cart from going too far back in fixing it: and the letters *d d* denote the upper part of the cart, which is extended to contain bulky or heavy loads.

The following are the advantages to be derived from the adoption of the drag here described:—

1. The degree of friction and pressure may be expeditiously adjusted to the steepness of the declivity; so that the cart will neither press forward, nor require much exertion in the draught.

2. The friction is judiciously applied to the wheel, in such a direction, that a given pressure will produce twice the effect in retarding the progress which it would do if it had been immediately applied to the body of the cart, or to the axis.

3. The apparatus is capable of being arranged with such facility, that it may be instantaneously adjusted, without stopping the cart, or exposing the driver to danger.

4. It may also be remarked, that still greater benefit may be derived from this invention, by applying it to *both* the hinder wheels of *wagons;*

thus, the resistance may not only be proportioned to the steepness of the declivity, so as to prevent most effectually the damage done to the high roads, and the unnecessary labor of cattle, when drawing locked carriages down hills; but it will also remove the danger of the frequent accidents to which drivers are exposed; and will save that time, which is now of necessity lost, in locking and unlocking wagon-wheels.

From the Ohio Farmer.

BLUE COLORING MATTER FROM STRAW OF BUCK WHEAT.

We intended to have mentioned this subject earlier in the season, in order that some of our readers who had buck wheat upon their premises might try the experiment and ascertain more satisfactorily the facts of the case. But we will bring it forward now; perhaps it may be recollected in its proper season. The method which has been recommended for preparing the coloring matter from this plant is the following—cut the stems before the grain is fully ripe, and spread them upon the ground exposed to the sun and thus exposed until the seeds drop off with ease. When the grain is separated from the stems, they are thrown into heaps, moistened with water, and left to ferment to such a degree, that decomposition takes place, and a blue color is developed. It is then formed into balls or flat cakes which are dried in the sun or by a stove, after which if the balls are boiled in water, they impart an intensely blue color which is not effected by vinegar or oil of vitriol. It may be converted into red by adding an alkali as potash or soda, with nutgalls it strikes a blacker color, and a very fine green is afforded by evaporation. It is said that stuffs dyed blue by this preparation retain their colors well and appear very handsome.

We have never prepared any coloring matter from this plant, nor can we vouch for the truth of the above statement, but certainly, we think it worth a trial.

From the Southern Planter.

REMARKS ON THE MANAGEMENT AND VALUE OF GAMA GRASS.

Mr. Bartlett—I beg you to receive my thanks for your kind attention in forwarding the back numbers of your valuable periodical. Since I have had the perusal of them, I am perfectly informed of what my *loss* would have been, had I not received them. On looking over those numbers I discover in one of them, some remarks on, and inquiries respecting the *Gama Grass*. Having been the first individual who was so fortunate as to get the public attention directed to this plant—which I am compelled to view, after an assiduous cultivation of *ten years*, as of extraordinary value to the agriculturists of the south, I feel myself competent to answer those inquiries satisfactorily, and I think, to do away the imaginary objections suggested.

With me this plant is found to grow *in every kind of soil:* but certainly to exhibit its extraordinary productiveness, the soil must be good, naturally, or made so by art. And in addition, the presence of calcareous matter is essential. As it regards its *growth*, after being cut *monthly*, I am yet to learn the name of a plant that equals it, if the soil is properly prepared. I have cut it *twenty-three inches* after *fifteen days* growth. At this stage, I am (after years of experiments made to determine this point,) now fully convinced that in the production of milk, and butter—two of the most agreeable *et ceteras* of a comfortable table, it is not excelled even by the wide pea vine, so long celebrated for the production of those two articles, in their richest and most delicate state.

For the purpose of making *hay* or dry forage for the winter support of animals, this grass has been well tested. See a communication in that valuable agricultural paper, "The Baltimore Farmer," of the 9th of September last. In curing this grass for *hay*, it ought to be cut at *thirty days* growth, when it may be taken from the scythe and stacked, if mixed with equal quantities of good oats, rye, or rice straw, each layer of grass is laid on (or what is better, mixed as stacked) sprinkled with salt, when it will be found to cure admirably, and impart a great portion of its highly aromatic flavor to the straw, increasing the mass of excellent forage.

In cutting this grass at thirty days growth, the sickle is certainly the most ecomomical plan, and sufficiently expeditious for soiling; but I can assure your readers that but little practice is requisite to learn an individual to cut with the scythe. I have had it cut both ways without any difficulty.

I notice the remark, that as the roots progress in age, the blades come out from around the edges, and leave the centre of the root bare. To this objection I will candidly communicate a piece of information I lately received, and which obliges me to believe it is entirely owing to our mode of cultivation that this takes place. About two months ago, a most observing planter called on me for the purpose of having some conversation on the subject of this grass. This peculiarity was noticed; he immediately remarked, that in a patch of the gama found in his field, in its native state, about one acre, there was not one root to be found in the abovementioned situation; that a remark of mine had induced a close examination; and added that it was entirely owing to my mode of cultivation that the roots exhibited this appearance. That I cultivated to produce root, by giving a distance that caused the root to spread to an unnatural breadth, and which prevented that thick coat of foliage found attached to the plant in its natural state; that none of the roots found in his patch, which to his knowledge is fifteen years old, and appeared as old and luxuriant when he settled on the land (black limestone land) could have been originally more than twelve inches apart; that when he first noticed this plat of grass and attempted to break it up, with the plough, the ground was totally occupied with the roots, and which prevented his effecting the destruction of the plat; that finding his horses, mules and oxen preferred it to all other grasses, he let it stand for hay, and from it made annually several stacks. The statement appearing to carry weight with it, I went the next day and examined for myself, and found the whole entirely correct; and am now induced to believe his observation judicious. In consequence of this circumstance, I shall plant a lot of gama at twelve inches from plant to plant, and let trial determine the correctness of theory. During a ride last month through a part of the Choctaw country, I found this grass in greater luxuriance than I have ever been able to produce it, and uniformly I

found the roots close together, and the blades not more than half the width of that cultivated as I have done. Giving the roots so much distance, I am now assured, produces a worse growth of blade.

As regards the important point, viz. the nutritive quality of this grass, in addition to my own experience, which has established its highly nutritive character, I beg leave again to refer to the communication before mentioned. I have frequently stated my own opinion on this subject. I am happy to find it completely corroborated by others. Your agricultural friends have nothing to fear in the cultivation of this grass, but the difficulty of getting seed to plant. I shall give the result shortly, of a trial to produce this grass in the highest perfection, made this year. To the mode of planting and preparing the soil the singular production of vegetable matter must be attributed, the season has however, been remarkably fine with us for grass and weeds.

PLANTER.

ON THE ADVANTAGE OF APPLYING GYPSUM IN QUANTITIES UNUSUALLY LARGE.

To the Editor of the Farmers' Register.

Fauquier, Feb. 4, 1835.

In a letter I addressed to you in August last, I told you that I entertained the opinion that poor land should have *twenty bushels* of Plaster of Paris put upon it, if the proprietor desired to improve it *speedily;* and I promised to give the reasons on which my judgement approved the use of that quantity.

In the winter of 1828-9, I fallowed a poor field of 30 acres with the view of improving it; but for reasons not necessary to be stated, 8¾ acres were put in corn, at 3 feet by 4. In the hills I had 2½ bushels of plaster put. A part of the corn was *rolled*, and on the remainder the plaster was thrown dry. In the fall of 1829, wheat well rolled in plaster, was sown on this land, and in March clover seed were sown. In April, 1830, I ordered 30 bushels of plaster to be sown on the field of 30 acres; but fearing that the sowers might oversow on the best of the land and leave the poorest without any, I directed that about an acre, (a cove that received the deposite from an adjoining wood) should not be sown till the balance of the field had been. My fears were realized: when they finished sowing there was no plaster for the omitted acre, and none was put on it for some time. About the 20th of May clover attains its greatest growth. From the time that grass took a steady growth to the period of maturity, many persons observed that my corn (i. e. of the previous crop of 1829) had been manured in the hill. The clover that grew on the hills in which the corn had been planted was at full growth, three feet high, while that on the intervening ground was not more than five or six inches high, and of pale sickly yellow color. The next spring the difference in the vegetation on and contiguous to the hills was still very great.

In order to ascertain the quantity of plaster which had been used, per acre, in the corn hills, with such manifest benefit, I ascertained the number of corn hills in each acre, doubled that number for the number of corn stalks, allowed 1¼ inches square for each stalk, and then the number of square inches in an acre, which multiplied by 8¾ will give the number in the ground planted in corn. The ratio between the space occupied by the corn stalks and one acre is as 1 to 22, and a large decimal. At the rate then of 22 bushels of plaster to the acre, was it used on my corn. The benefit was as manifest as if manure had been put in each hill, and was distinctly to be seen for two years. The third year the field was put in corn—the plaster scattered, and, of course, I could not discern a continuance of advantage from it, but as long as the earth was undisturbed the increased quantity of grass and the richness of its verdure on the spots on which the corn had grown was strikingly manifest. The corn was not hilled. I then thought, and now think, hilling an entire loss of the labor employed in the operation, if not injurious.

There are some other facts which tend to prove the utility of using plaster more largely than the present stinted allowance of half a bushel to the acre: but writing is a laborious employment, and I am willing to rest my opinion on the leading facts I have stated, and the few following observations. In England 400 bushels of lime are used on an acre with great advantage—in Pennsylvania 200 bushels are used, and often upwards of 300. The valuable principle of lime and plaster is the same, as I have been informed, but in what ratio it exists in each I do not know; but I suppose it cannot be in a greater ratio than 20 to 1 in favor of plaster. If this be the ratio, then my opinion that 20 bushels of plaster may be, and ought to be, used on an acre of thin land, is strengthened by the quantity of lime used in the countries I have mentioned. In Pennsylvania a greater quantity of lime would be used, I presume, but for the expense of it. They could safely employ it to the same extent as in England. I shall use plaster as largely as my means will allow.

I also expressed the opinion to you last summer, that the mere growth of corn, wheat, &c. *did not injure* land. The reasons are obviously correct. If we compare the weight of an acre of forest with the largest product of an acre of the best river lowground, or manured upland, for 150 years, we shall be satisfied that the difference of weight, (or of *substance extracted* from the earth) in favor of the trees is very great, while the woodland is best. It will be said that the leaves of the trees increase the fertility of wood land—but look at the small return made to the earth by the leaves of one tree, and we must be satisfied that but very little can be derived from them—too little to be received in computation when compared with clover, &c. &c. Further, it is a generally received opinion, that wheat fallows improve land, while it is as generally known that corn, oats and buckwheat injure it. But it is not owing to the plant—but the mode and period of cultivation necessary to rear it, that is injurious. Wheat does not injure, because when the earth is prepared and has received the crop it is no more disturbed, and the action of the sun upon it is very slight. In the cultivation of corn, and preparation of the earth for oats and buckwheat, it is made so light as to receive the *heat* to the depth of several inches, during the spring and summer, when the sun acts with such power on it. *Heat* is the great destroy-

er of the vegetative or nutritious principles of the earth. Fall crops do not injure land as much as spring and summer crops, for the reason that the action of the sun is feeble—the nights are long—dews are copious, and by the spring the earth is so compact as not to receive the rays of the sun, and is soon shaded by the wheat, &c. For these, among other reasons, I am satisfied that the earth is not empoverished by the growth upon it.

The last observation I have made, to wit: that "*heat is the great destroyer of the vegetative or nutritious principles of the earth,*" requires some remarks. Make the *richest* earth into bricks—then pulverize them, and you will find that seed will not sprout in the dust, or if they sprout they live but a short time and perish for want of food. The valuable principle is killed or expelled by heat. Take a piece of plank, say 12 inches square—place it on a gall; let it remain for one year, and then sow seeds on the place covered by the plank and on the conterminous earth, and you will find the plants on the space covered by the plank much more vigorous than their neighbors: indeed, that they will survive through the summer, and yield fruit, while those on the earth which was not *shaded* will sprout and soon die.

JOHN ROBERT WALLACE.

ON THE CULTIVATION OF CORN.

To the Editor of the Farmers' Register.

Fauquier, Feb. 4, 1835.

I have been a farmer for five years only, but as my mode of cultivating my land differs from that usually pursued, and has returned me a larger reward than the same quantity of labor bestowed on even better land, I will communicate it to you. Impressed with these truths—

That heat is a great destroyer of land—

That deep ploughing is indispensable—

That the roots of corn ought not to be injured or disturbed—and

That the corn crop ought to be so cultivated as to make the best crop of wheat—

I accordingly have my land broken up as deep as two and three good horses can do it. I require the sod to be as carefully turned as if for fallow for wheat. The ground is then well harrowed, the harrow running as the plough. The usual mode is pursued in laying off with a very small shovel-plough. The corn is planted, (from the 12th of April to the 1st of May,) and as soon as it is thinned, I use cultivators of five teeth, (set in as in a triangular harrow,) made of harrow iron—the teeth flattened for two inches, sharpened and turned so as to enter the ground. With these implements my corn is worked three and four times. But if there has been much rain, so that the grass cannot be kept down by them, or if the ground be very hard, then I direct the double shovel-plough (about as long as the hand, and one-third broader) to be used; but if there be time after it, I again use the cultivator, in order to level the land and prevent washing. In the use of both these implements, orders are given not to turn a sod up, and if it be done, to replace it. By this mode a very small portion of the earth is exposed to the action of the sun; the roots of the corn are not wounded, and can readily extend themselves in their search for food; the moisture of the earth is longer retained; the ground does not wash, and the fine vegetable mould made by the rotted grass and roots is preserved from the sun for the nourishment of the corn and the following crop of wheat.

Having gathered my fodder in the old mode, when ready for sowing wheat, I have the corn cut and stacked in small stacks—the same ploughs running at the same depth with the ploughs used in the spring. On the land thus prepared, my wheat is sown and harrowed in. The crops of wheat are decidedly better than those put in with that mischievous shovel-plough, which (next to negro labor, that ever has, and ever will carry desolation and ruin in its train,) is the greatest enemy to good crops and good land, that the human intellect can devise in the form of an implement of husbandry.

This mode of preparing the land for wheat, has these advantages: the decayed grass, &c. is thrown to the top, nourishes the young wheat, preserves it against frosts and winds, and when hard freezes occur, owing to the depth of the ploughing, the water is dissipated, and the body of earth is too heavy to be affected by any but the severest spells of weather. When the crop of corn has been properly cultivated, and the ground prepared as above, the crop of wheat is not much inferior to a fallow crop: the reasons must be obvious to every one.

As to the corn crop, I am not left a doubt of its advantages over every other I have heard of. I have *never failed* in a crop. If the season be wet, the water sinks to the sod, where, owing to the grass and roots, it is retained by them by absorption, and is prevented from passing off rapidly. The earth too, being more compact than when the shovel-plough is used, the water is much more slowly evaporated, and in hard rains, owing to this cause, and the smoothness of the surface, but little of the soil is washed away.

In drought when other fields of corn are exhibiting its serious effects upon them, corn cultivated in the manner above mentioned, shows but little, if any injury from it. Wherever that destroying enemy, the shovel-plough, is used in dry seasons, its injury to the crop is shown after each ploughing, in the withered blades and sickly color of the corn. Owing to the depth they run, the roots of the corn are *wounded*, *broken*, and *huddled together* in bunches, instead of being expanded through the ground as the radii of a circle.

Is it not surprising to see how almost universally the notion prevails, that it is *serviceable* to *break* the *roots* of corn? They do not seem to comprehend the offices of roots. One set of them is to support the plant; these shoot out when the ear is forming, and descend perpendicularly into the ground; the other, shooting out horizontally are purveyors—they spread themselves through the earth in search of food; but if they are bruised or broken, they cannot do their duty, for they must first be healed to enable them to do it, and then being forced altogether they must receive less nourishment for themselves and food for the stalk, than if they ran through a circle, doubling in its diameter, any one of the roots. What would be thought of the reason of a man, who declared it to be his opinion, and practically enforced it, that the best mode of fattening a bullock was to wound his tongue, disable his jaws, and break his teeth whenever he reached his head towards food? Can

that means or reason be better than his, who maintains, that it is advantageous to the growth of corn to break its roots, to deprive it of food—to make it sick—to close its mouths—to starve it?

I give you these views in conformity with the promise I made you, and regret that I have not time to give them with more system, and in better dress. But such as they are, I am willing for them to undergo the ordeal of rigid scrutiny. If they be erroneous, I shall be benefited by the correction—if they are true, others will be by their publication.

JOHN ROBERT WALLACE.

ON THE CONSTRUCTION OF FIRE PLACES.

To the Editor of the Farmers' Register.

There might be a great saving of fuel among us, (for this is a subject that certainly merits attention,) by a proper management of our fire-places, and especially those of our cabins. These are generally so large, burning almost a cart load of wood at a time, that nearly all the heat escapes up the chimney. If they were made smaller, and on the same principle as those of our dwelling houses, half the wood would answer the purpose; and of course, half the labor be diminished in getting it. But even here, although the general form and principle (which appears to be all that is aimed at) is obtained, yet even these are not constructed according to the just proportions and dimensions of the improved fire-places of Count Rumford and Dr. Franklin; as it will appear from the following figures, which illustrate the difference between the old and the improved fire-places.

FIG. 1.

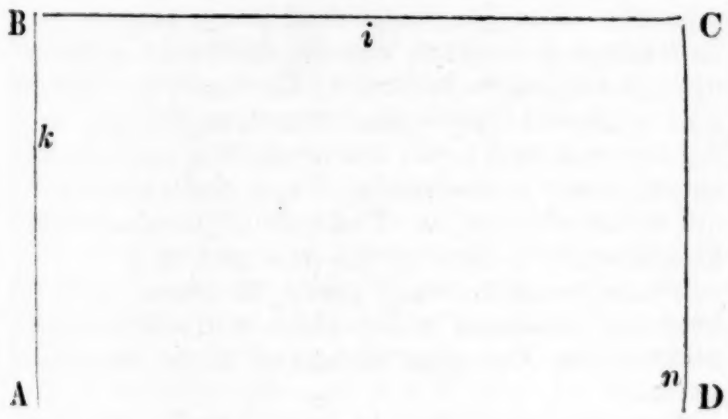
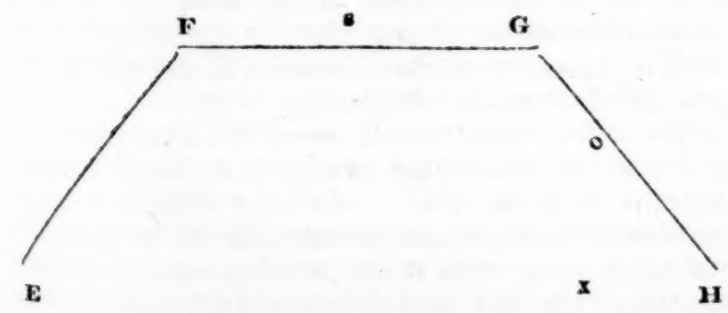


FIG. 2.



A B (fig. 1) is the opening in front, B C the back of the *old* fire-place, A B and C D the covings, and A B C and D C B the angles made by the covings and the back.

When altered, E H (fig. 2) the opening in front, F G the back, E F and H G the covings, and E F G and H G F the angles made by the covings and the back.

In constructing this fire-place, the angles E F G and H G F made by the covings and back, should be 130°, the fire-place six inches deep from front to back, in small rooms; and from eight to twelve inches in large rooms. It is thought by some, that an inch to every foot of the room in breadth is best—thus, if the room be twenty feet square, the fire-place will be twenty inches deep, measuring from front to back, along the place where the fire is made. The vent for the smoke four inches wide generally; varying, however, with the size of the opening or mouth of the fire-place. The back should be built erect (and not started inclining inward as is common) as high as the ordinary height of the wood when the fire-place is full; then projecting inward, and run in that position to within four inches of a line drawn perpendicularly from the lower edge of the mantle or iron bar to the back, then abruptly sloping back—this is the height of the back, and the point at which it begins to form the throat, or hollow place above the vent. When the back begins to slope inward from the bottom or foundation, it not only reflects the heat down against the floor, but it also obstructs the ascending smoke.

A fire-place of the above construction, consists of the following parts, (which we shall here enumerate, in order that the following remarks on the nature of the alteration and improvement of the old fire-place, may be more clearly understood)—the *hearth*, the opening in front or *mouth*, the jambs or *covings*, the *back*, the *mantle* supported by the iron bar, the *vent* (sometimes confounded with the throat) through which the smoke enters the throat, the *throat* itself above the vent, the *flue* or funnel, through which the smoke ascends into the air, and finally the *shaft*, or what is commonly called the chimney itself. The principal improvement made on the fire-place, was an alteration in the covings; first, in regard to their *depth;* and secondly, the *direction* in which they were run—by running them shallower the back of course was brought forward, and consequently, the burning fuel was brought more into the room, and thus the benefit of the heat obtained. And by running them at an oblique angle with the back of 130°, instead of 90° a right angle, the covings were converted into a reflecting surface, by which the heat which lodged in the corners of the old fire-places, and thence escaped up the chimney, was reflected into the room. The vent next was diminished, by which more heat was retained in the fire-place, and the draught strengthened, (or the chimney made to draw better as it is commonly said) and consequently less liable to smoke.

All these different parts of a fire-place and chimney should be well constructed, and in due proportion; for the heat and smoke is affected by all of them. Thus if the *mouth* is too large, too much air is admitted for the fire, which has the same effect in putting it out or cooling it as too little; and by cooling the fire, of course weakens the draught, and causes the chimney to smoke.

If the *covings* are perpendicular to the back, the heat, instead of being reflected in the room, will be reflected from one coving against the other. Thus if a ray of heat thrown from the centre of the back of the old fire-place at *i*, impinges on the

coving A B at *k*, it will be reflected against the opposite coving C D at *n*; and of course a person sitting in front of the fire, loses the benefit of it, unless he be sitting in the corner somewhat facing the coving. But if a ray of heat thrown from a point in the centre of the back of the new fire-place F G at *s*, in the same direction as in the former case, and falls upon the coving G H at *o*, it will rebound in the direction towards *x*, in front —for the angle of reflection is always equal to the angle of incidence. A person sitting, therefore, before the fire, will enjoy the benefit of a ray so reflected. If the covings be made of a substance that absorbs more than it reflects, a great deal of the heat is lost. They should be made of a material that reflects more than it absorbs, and if possible, of one which does not absorb at all. Dutch tiles, fire-stone, marble, and porcelain are used—common brick and mortar, if it was sufficiently durable, is the best material; which should be smoothly plastered, and kept white-washed, for black absorbs too much heat. The best coving for a fire-place, is that material which is most durable, least liable to crumble, the least absorber, and the greatest reflector, and that which is susceptible of the highest polish, for the more it is polished the more heat it reflects. Any one may be convinced of this, if they will place the bottom of a polished plate of tin (or the bottom of a coffee-pot) by the side of the face, while standing before the fire, so that the ray of reflection may strike the face after it is reflected from the tin: a higher degree of heat will be sensibly felt. When the image of the fire is seen on the tin, then the ray strikes the face. A tin plate would be a good thing to regulate the position of the covings. The mantle also affects the heat and smoke. If this be too high, the draught is weakened, and the smoke puffs out into the room before it reaches the vent: if too rugged in the inner-side, it obstructs the smoke: it should be smoothly and soundly plastered, that the smoke may curl around it on the inner-side.

If the vent is too large, too much heat escapes, and the draught is also weakened—if too small, the smoke is obstructed: if the fire-place is too large for the vent, it takes in more air than can pass up the chimney; as an animal can take in its mouth more than it can swallow: the mouth should ever be in proportion to the vent. It is an established rule in the construction of stoves, and furnaces with grates, that the area of the vent should be equal to the sums of the area of the open spaces between the bars of the grate through which the air is admitted to the fire: but the object here is more to increase the heat within the furnace by a rapid combustion, which is always in proportion to the strength of the draft, which is at its smallness and swiftness, (hence the powerful heat produced by the mouth of the bellows,) and therefore cannot strictly apply to an open fire place, where the object is not confined heat, but reflected. If the mouth was made as small as the vent, very little heat would be reflected in the room, though the combustion would be more rapid. This is well known to those who have been in the habit of kindling a fire made of coal, by placing the kindler before the mouth, so that a small space is left for the admittance of the air, or oxygen. The same may be seen by placing a blanket before the fire, when the draught is suddenly increased, accompanied with a great roaring, and the combustion goes on rapidly.

Again, if the flue is too large, the draught is weakened, and a quantity of soot is formed; for in this case the flue contains so much cold air, it weakens the draught, and hence not being sufficient to drive out the soot, it lets it fall on the sides of the flue. The same takes place in the channel of a stream, (which has been made use of to illustrate the draught in a chimney.) The stream is always swiftest where the channel is narrowest, (the volume of water being the same,) hence it is able to carry the sand along: but if it suddenly spreads into a large channel by which the stream is weakened, it drops the sand on the sides of the channel, or in the deep holes. The stream is always swiftest in the middle, and frequently runs backwards at the sides, and hence the sand is left there, where the current is weakest. It is on this principle that soot is formed in a flue, of any construction. The draught or current of air and smoke being stronger in the middle of the flue, it drops the soot on the sides where it is weakest. On the other hand, when the flue is small, it is heated all the way up, and the air in it; and thus the draught is made to ascend, by the heat rarifying and raising the air.

If the *throat* is too *large* the soot collects in it, for the same reason mentioned above. This, however, is an advantage; for if a deep recess be made above the vent, (or a deep throat) nearly all the soot formed may be collected, when it may be swept out. Upon this principle furnaces have been constructed so ingeniously as to clear the flue of soot almost entirely. Any one may notice how soot is collected in holes in the back of a fire place, above the fire, where a brick happens to tumble out: for this reason, the throat, vent, flue, and rough places in the back, should be made smooth. Finally, if the shaft is too long or high, the chimney is apt to smoke, for then the flue being too long to be heated all the way, the cold air in it will cool and weaken the draught, and being heavier too, will press the ascending smoke down the chimney in the room: if too short the wind is apt to blow down it. The size of the shaft should be generally to that of the flue as 4 to 1.

These remarks may serve to show, how the heat and smoke of a fire-place and chimney, are affected by the construction of their component parts.

But the great secret in managing a fire-place, so as to obtain the greatest degree of heat from the smallest quantity of fuel, and to prevent smoking, is the management of the draught. This is easily affected by every part of the fire-place, as well as by other external causes, as the air, winds, groves of trees, buildings, &c.

To understand the *nature* of the draught—it is a current of heated air, produced in the fire-place, as soon as a shovel of coals or a chunk of fire is introduced: which ascends the flue of the chimney, carrying along with it the smoke, soot, and other matter of the fuel: and is formed on the principle of the expansion and rarification of that element The heat of coals rarifying the air just around them, divides it in into minuter particles, and consequently becoming lighter, they ascend through the denser air up the chimney: this produces a partial vacuum (for there is no real vacuum in nature, though one can be made by art,) around

the fuel, into which, the fresh air rushes out of the room: this being again rarified as the former portion, ascends—and thus a constant current is kept up as long as the combustion goes on. As soon as latent heat becomes sensible, by the collision of flint and steel, and the compression of the air between them, or in other words, as soon as a spark of fire is born into the world, and kept alive by combustible matter, this current is formed around it, by rarifying the air. On the same principle the heat of the sun produces the winds, (according to the theory of Dr. Halley, now generally received.) This is the case with the great east wind which blows continually from east to west, in the direction of the apparent diurnal motion of the sun, and prevails in all the extensive oceans. The heat of this luminary, warming the air under it, (or rather it should be said, warming the earth, and that warms the air by reflected heat—for the rays of the sun have no effect on that medium through which they pass,) rarifies it, and a fresh portion rushes in the partial vacuum, in the direction of the motion of the sun, and thus the current is kept up. This is also the cause of the north and south winds which blow towards the equator: the heat of the sun being hottest there, the air rushes in from those points to supply the consequent vacuum. But to return—the current or draught thus produced by the heat of the fire-place, is supplied by fresh air from out of the room, which if it were made air-tight, would soon produce a vacuum, in which no animal could long exist. But when the air of the room is exhausted, fresh portions are admitted through the doors, windows, and crevices of the room: if all these apertures are closed, the combustion ceases, and the fire goes out. Air is no less important to keep up a flame, than it is to support animal life. The principle of the air or atmosphere which feeds the fire or supports combustion, is oxygen, one of the two gases of which the atmosphere is composed: the other is azote. If the air is deprived of oxygen, it will no longer support combustion—for if a lighted taper be put into a vial of such air, it will be extinguished; but if a bit of wire be dipped in sulphur and lighted, and then put into a vial of pure oxygen gas, it will be rapidly and brilliantly consumed, and the melted iron will sink through the bottom of the vial. The absolute necessity of oxygen or the atmosphere to promote combustion is forcibly presented: if a pipe be admitted to the fire along the floor, having a communication with the external atmosphere, a current is suddenly formed, which rushes violently with a noise from the mouth of the pipe through the fire up the chimney. This shows what a powerful demand the fire has for air, which increases the heat and combustion in proportion to the rapidity of a succession of particles of air introduced to fire; hence, the powerful intensity of heat produced by a blow-pipe or bellows. The combustion, and consequent heat, seems to be also in proportion to the smallness of the aperture through which the air is admitted; but this may be still owing to the rapidity of the current, for this depends upon its smallness. From this it well appears, how much the management of the draught depends upon the air; and as the combustion, and consequently the heat, depends upon the draught, and also the smoke which is driven by the draught, the great nicety in managing the draught will likewise appear.

Although air is so necessary to the fire, too much air, like water, weakens combustion, and consequently the draught, and renders the chimney liable to smoke.

These facts suggest some means for the curing of smoky chimneys. Thus, when all the apertures of a room are closed, too little air is admitted—this weakening the combustion, and that the draught, the latter is not sufficient to drive the smoke up the flue; the consequence of this is, the weight of the external atmosphere presses the smoke down the chimney into the room, especially if the wind blows, in which case the current of wind being stronger than the draught, it puffs the smoke into the room. The remedy is to open the doors, &c., and admit the air: the same happens when too much air is admitted, which cools, and of course weakens the draught, and not being sufficient to propel the smoke, it is pressed back by the external air in the apartment: in this case the doors must be shut. The weakness of the draught is the most frequent cause of smoky chimneys. This is produced in a variety of ways. Very often a weak fire causes the chimney to smoke; for, as the heat and combustion depend on the draught, so the latter depends upon the former: so that when the fire is low, the smoke curls weakly up the chimney. The remedy suggests itself—kindle up a brisk fire.

There is another way in which the draught is weakened, or rather overcome: for the want of ventilation in the upper part of the room. There are always two sorts of air in a room where fire is kept—a light and heavy. The former occupies the upper part of the room, where, if it has no vent, it rushes down the wall to the mouth of the fire-place, and curling round the inner side of the mantle, forces its way up, and by its superior strength drives back the smoke, especially if the draught happens to be weak. There are always two currents passing through the mouth of the fire-place if the room is not ventilated above, as well as through the door; this may be seen, by holding two feathers—one at the top, and the other at the bottom of the mouth of the fire-place—they will be drawn inward: but in the case of the door, one of the currents is going out at the top, (the lighter) while the other (the heavier) is coming in at the bottom, which may be seen by holding two candles, one in the lower and the other in the upper part of the door. The upper one will be blown outward, while the under one will be blown inward. The draught is affected, when several vents open into the same funnel; for the fresh air rushing in through these vents out of adjacent rooms, puff out the smoke: this ceases, when a draught is formed in every vent by kindling fire in the different rooms at once. Straight funnels affect the draught, because the wind is more easily admitted down the chimney to the fire. Large fire-places with small vents affect the draught, and likewise the contrary. The want of ventilation affects the draught, and of course, the smoke. When the draught is weakened in this way, a pipe admitted to the fire, terminating at the hearth or within the fire-place, having an external communication with the air, will prevent smoking. The pipe may be either conducted on, or under the floor. The draught is sometimes affected by having the ventilators for letting out the foul air of a room, too low down above the fire place, (which

by the by is a very good contrivance for getting rid of foul air,)—the light air just spoken of, rushing through the ventilator, is apt to push out the smoke into the room, overcoming the draught. Besides, fresh air too, often rushes in there, (it being so low down,) and obstructs the smoke. These ventilators would answer remarkably well at the top of the wall, where the light foul air is always lodged. (I think it a question however, whether a ventilator for foul air, should be connected with the chimney, on account of its affecting the draught.) A fire-place often smokes at the kindling—this is because the draught is not formed, which carries up the smoke: this is prevented by using very combustible matter in kindling—such as light-wood, very dry wood, &c. In cabin chimneys the shortness and largeness of the funnel when the vent is too large (equal in fact to the chimney itself,) affects the draught, and smoke—make the vent smaller: this will prevent the wind also from having too powerful effect on the fire. Sometimes one flue and room is filled with the smoke of another flue,—closing the communication between the two will prevent the evil.

The draught is not only affected by the construction of the chimney and fire-place, but by other causes—as the wind, &c. This has called in use the construction of arches over the top of the funnel. When a chimney smokes from the wind blowing down the funnel, where there are two funnels in the same shaft, they must be separated at top by arches. When a chimney smokes from a particular direction of the wind—as N. W. for instance—and is obstructed by any obstacle on the opposite side of the chimney, as higher buildings, trees, &c., a funnel of tin swung over the top of the chimney to move with the wind, will prove a remedy—the wind claps one part of the funnel close to the top of the chimney in that direction in which it blows—this prevents it from going down the chimney, while it turns the funnel (or cap) up in the opposite direction, to open a passage for the smoke. The manner in which groves of trees, higher buildings, hills, &c. affect the draught is, by obstructing and reflec ing the winds in various directions.

NICHOLAS E. READ.

Charlotte County.

THE TENNESSEE FARMER.

The publication of a new agricultural paper has lately been commenced in Tennessee, edited by Thomas Emmerson, Esq., of Jonesborough. Though appearing in size and form somewhat suited to its low price of $1 a year, it exhibits such evidence of editorial ability, as promises a valuable work. There is abundant room for the labors of Mr. Emmerson, and we heartily wish success to his exertions. We may not be altogether disinterested in this wish—for it would operate directly and greatly for the advantage of the Farmers' Register, if our brother editor can convince the tillers of new and fertile lands of the south-west, of their mistake in the opinion so very generally entertained, that they have no need for agricultural journals—a fertile soil alone being deemed sufficient to supply every defect of economical management, and of agricultural information.

The two following editorial articles are from the second number of the Tennessee Farmer, just received. The first is introductory to the insertion of an article which formerly appeared in our work, ("Another way of fattening hogs.") From these remarks it may be inferred, that the economy of our customary way of raising and keeping hogs, is at least doubtful in a new country like Tennessee, where the disadvantage of the plan must be much less than in Eastern Virginia.

From the Tennessee Farmer.

ON HOGS RANGING AT LARGE.

We invite the attention of our readers, to the article in this number, from that valuable work the Farmers' Register, on the raising and fattening of hogs. It will be found to contain some humorous sarcasms, on the absurd mode adopted in Virginia, and with little alteration, too generally practiced in this country, of rearing this valuable animal—a mode which though adopted for its supposed economy, is in truth, perhaps the most wasteful, the most extravagant, and the most unprofitable ever yet devised. The actual loss annually sustained in Tennessee, from the manner in which hogs are generally reared and fattened is immense; and would, could it be ascertained with precision, astonish those by whom it is resorted to under the erroneous impression, that it is recommended by its economy. We should hazard little by asserting, that by a more humane and judicious mode of rearing hogs, double the quantity of pork could be annually raised from the food now expended in raising the half—and that pork too, of far superior quality. To raise hogs with profit, except in a few situations, possessing peculiar advantages, situations now rarely to be met with, two rules must be observed. First—to feed the sows in such a manner as to enable them to keep the pigs fat until weaned. Secondly, never to suffer them to become poor after they are weaned. By observing these rules, especially with the aid of clover, it will be easy to make a hog at from twelve to eighteen months weigh double, if not thrice as much, as many now do at two and three years old, and with no greater quantity of grain than is now often expended in rearing and fattening the latter. The suggestions of the writer of the article alluded to, are well worthy the attention of all who wish to convert their corn into pork with profit. The absurd selfish notion, that whatever a hog picks up in the woods, or in his neighbors fields, is so much clear gain to his owner, ought long since to have been banished, by the notorious fact, that many hogs thus raised, after being fatted, will not at a reasonable price, sell for as much as the corn cost, consumed by them. Whereas, one judiciously raised, will sell for double the price of the grain expended in rearing and fatting him. If any one doubts the truth of this assertion we only ask him to make the experiment on two litters of pigs, keeping an accurate account of the food consumed, and of the price of the pork yielded by each, and his doubts will be speedily removed.

To keep stock of any description, in a state of almost constant starvation, is cruel and immoral, and it will, on a fair experiment, be found, that in this instance, as well as in every other, Providence has so connected the duty and interest of man, that he cannot violate the former but at the expense of the latter. Were this great truth well

understood and well considered, it would produce many valuable improvements in agriculture, it would save the innocent and helpless domestic animals from a dreadful mass of suffering, and it would save the earth, from that empoverishment, by which posterity are subjected to oppressive labors and hardships for its renovation, which an enlightened regard to their own true interests, on the part of their ancestors, would have rendered wholly unnecessary. As the rearing of hogs ought probably, in the present state of East Tennessee, to form a prominent item, of her agricultural pursuits, we propose from time to time, presenting to our readers the most valuable articles on the subject, which may be within our reach, and we earnestly request those who may have made any valuable experiments, to furnish us with a detailed account of them, and of their results. Our own experience authorises us confidently to assure our readers, that regular salting is no less beneficial to hogs than to other stock, and that to spread the salt on ashes in the salt trough, is a mode well calculated to preserve the health of the animals.

From the Tennessee Farmer.

ON BURNING GYPSUM.

A subscriber propounds to us the following questions:

1st, Will the burning of plaster answer in lieu of grinding?

2nd. If so, how should the process be conducted?

We should be glad to receive replies to the above inquiries from any of those who have made the experiment. In the mean time we would advise our correspondent to make an experiment on a small scale. We have heard of burnt plaster being used with advantage near Abingdon, Virginia. We once endeavored to make an experiment but found it difficult to burn the plaster on a log heap so as that it would slack. The practice of burning, nay even of kiln drying to facilitate the grinding, is condemned by others as very injurious to the plaster—we should therefore be loth to try it on a large scale.

From the Farmers' Series of the Library of Useful Knowledge.

ON DRAUGHT.

It will be necessary first, to explain and define clearly some terms which will occur frequently in the course of this paper, and especially the word 'draught,' which is the title itself of the treatise.

This word is used in such a very general and vague sense, that it would be difficult, if not impossible, to give an explanation which should apply equally to all its different meanings.

In the expression draught by animal power, it would seem to mean the action itself of drawing, while, on the other hand, it is frequently used to signify the amount of power employed, also the degree of resistance, as when we say the draught of a horse, or the draught of a carriage. Draught power is also an expression used. We shall, however, in the course of this treatise, confine our use of the word to the two meanings—*draught*, the action of dragging—and *draught*, the resistance to the power employed to drag any given weight.

Force of traction is another expression requiring explanation; but here we must enter into more detail, and shall give at once a practical illustration of our meaning.

A force is most conveniently measured by the weight which it would be capable of raising; but it is not therefore necessarily applied vertically, in which direction weight or gravity acts.

If a weight of 100 lbs. be suspended to a rope, it is clearly exerting upon this rope a force of 100 lbs.; but if the rope be passed over a pully void of friction, and continued horizontally, or in any other direction, and then attached to some fixed point, the weight still acts upon all parts of this rope, and consequently upon the point to which it is fixed, with a force equal to 100 lbs. and so inversely, if a horse be pulling at a rope with a force which if the rope were passed over a pully, would raise 100 lbs., the force of traction of the horse is in this case 100 lbs. Spring steelyards being now commonly in use, we may be permitted to refer to them as affording another clear exemplification of our meaning. In pulling at a steelyard of this description, whether the force be exerted horizontally or vertically, the index will of course, show the same amount; and, consequently, if the strength of the horse be measured by attaching the traces to one of these steelyards, the number of pounds indicated on the dial will be the exact measure of the strain the horse exerts, and the amount of strain is called his 'force of traction.'

Having fixed as nearly as possible the meaning of these terms, which will frequently occur in the course of our progress, we shall proceed to the division of the subject.

It is evident that there are three distinct agents and points of consideration in the operation of draught, which are quite independent of each other. They are—first, the moving power and the mode of applying it; secondly, the vehicle for conveying the weight to be moved; thirdly, the canal, road, or railway, or what may be generally termed the channel of conveyance.

All these individually influence the amount of draught, and require separate consideration; but the mode of combining these different agents has also a material effect upon the result: consequently, they must be considered in relation to each other; and to obtain the maximum useful effect, with the greatest economy, in the employment of any given power, it is evidently necessary that these different agents should not only each be the best adapted to its purpose, and perfect to the greatest possible degree, but also that they should all be combined to the greatest advantage.

We shall proceed at once, then, to examine the different agents now employed, the modes of applying them, and the proportionate effects produced.

And, first, with regard to the species of moving power;—

This may be of two kinds, animal and mechanical.

By animal power we mean the direct application of the strength of any animal to dragging or pulling, as in the simple case of a horse dragging a cart. By mechanical, the application of any power through the intervention of machinery; the source of power in this latter case may, however,

be animal strength, or a purely mechanical agent, as a steam-engine.

The latter is the only species of mechanical power which it has been attempted to apply practically to locomotion; and therefore that alone we propose to compare with the animal power.

Now, although these two powers, viz., simple animal power and the steam-engine, may in most instances be applied so as to produce the same effect, and may, therefore, to a superficial observer appear similar, yet there do exist such essential differences in the mode of action, or the means by which the effect is produced, that there are many cases in which the one may be used, wherein the other may be totally inapplicable.

In this treatise, draught by animal power is indeed the principal object of consideration; but as, at the present moment, there appears to be a great effort making to supersede animal power entirely by mechanical—to dismiss our old servant, the horse, and supply his place by the steam-engine, it may be as well, in justice to the former, to say a few words in his defence, and to take a rapid and general view of the distinguishing features of the two agents.

To enter into all their respective merits, and to weigh their comparative advantages under all circumstances, would involve us in many questions foreign to our immediate point of consideration, and would embrace subjects which may supply matter for future consideration well worthy of our attention. It is sufficient for our present purpose to show that there still exist great objections to the universal application of machinery to draught, objections which do not equally apply to the use of animal power; and on the other hand, that there are many advantages in the latter, which are not yet obtained by the former; and that animal power continues, for all the ordinary purposes of traffic upon *common roads*, to be the most simple in its application, and certain in its effect.

We shall confine ourselves particularly to the consideration of that part of the question which relates to the slow transport of heavy goods, as being the most important branch of the subject, especially for agricultural purposes. Economy is, of course, the grand desideratum in the consideration of this question; consequently, the comparative expense of the two powers, supposing them for the moment equally convenient and applicable, will first demand our attention.

A difficulty arises here, however, from the want of a certain measure of comparison. The power of a one-horse engine is by no means exactly the same thing as that of a horse. As we have before stated, the mode of applying them being different, the variations in the results are different, and consequently the effects do not bear a constant proportion to each other, under different circumstances; we must therefore be careful not to fall into the mistake which we have ourselves pointed out as a very common source of error, viz., the drawing general conclusions from data obtained in a particular case. We shall take the power of the horse, and that of the steam-engine as ascertained practically on railways, where the effect of each is less influenced by accidental circumstances, and consequently can be better ascertained than on a road. We shall confine our calculations of expense to this particular case, and then endeavor to discover how far the same results are to be expected, or what modifications are likely to take place, and what alterations are to be made in the results under different circumstances. As regards the first, viz., the comparative cost of animal and mechanical power on a railway, we cannot do better than quote the words of the late Mr. Tredgold upon this subject, and we accordingly extract the following from his work upon railways:—

'The relative expense of different moving powers 'for railways is an interesting inquiry, and the 'same materials being necessary to estimate the 'absolute expense for any time or place, it is desirable to give some particulars, to aid the researches 'of those who wish to make such comparative estimates. The annual expense of a horse depends 'on—

'1. The interest of purchase-money.
'2. Decrease of value.
'3. Hazard of loss.
'4. Value of food.
'5. Harness, shoeing, and farriery.
'6. Rent of stabling.
'7. Expense of attendance.

'According to the average duration of a horse 'in a state fit for labor, of the description required 'on a railway, the first three items may be estimated at one-fourth of the purchase-money; the 'food, harness, shoeing, &c., included in the 4th, '5th, and 6th, will most likely not exceed £40 'per annum, nor yet be much short of that amount; 'and supposing one man to attend to two horses, 'this would add £15 12s. if the man's wages 'were 2s. per day; and, at this rate, the labor of a 'horse of the value of 20£ would cost 60£ 12s. 'per year; or, since there are 312 working days in 'the year, the daily expense would be 3s. 10½d., 'or 186 farthings. But the power of a horse is 'about 125 lbs. when travelling at the rate of three 'miles per hour, and the day's work eighteen 'miles.

'The annual expense of a high-pressure locomotive engine, or steam-carriage, consists of—

'1. The interest of the first cost.
'2. Decrease of value.
'3. Hazard of accidents.
'4. Value of coals and water.
'5. Renewals and repairs.
'6. Expense of attendance.

'It is difficult to procure these particulars from 'the experience of those who employ engines; we 'will therefore annex, by way of example, such 'sums as we think likely to cover the expense. 'The first cost of the engine and its carriage may 'be stated at 50£ per horse power, and its decrease of value and hazard will render its annual 'expense about one-fifth of its first cost, or 10£ 'per annum per horse power. The expense of 'fuel and water per day will be not less than one 'bushel and a half of coals per horse power, and 'fourteen cubic feet of water; and, taking the coals 'at 6d. per bushel, and the water and loading with 'fuel at 3d., the annual expense will be 15£ 12s.; 'the renewals and repairs, at 20 per cent. on the 'first cost, will be 10£ which is as little as can be 'expected to cover them. Attendance, suppose 'one man and one boy for each six-horse engine, 'at 6s. per day, or 1s. per day for each horse power, or 15£ 12s. per annum; therefore the total 'annual expense of one-horse power would be '51£ 4s., or 158 farthings per day.' This power is equal to a force of traction of 166⅔ lbs. for the

same number of miles per day as the horse; but from this gross amount of power we must deduct that necessary to move the engine with its supply of coals: this will reduce it at least to 155 lbs., consequently, in the one case we have a force of traction of 125 lbs., at an expense of 186 farthings, and, in the other, a force of 155 lbs. at an expense of 158 farthings; and reducing them both to one standard quantity of work done, we find the expense of the horse is $\frac{186}{125}$=1.488, and of the locomotive engine 1.019, or about as 147 is to 100. In this case, therefore, there appears to be a decided economy in the use of the steam-engine, and accordingly its application has become very general, and is becoming more so every day.

Let us now examine what alterations are requisite, before we can apply these calculations to the case of draught upon common roads. Supposing both species of power equally convenient and applicable, and confining our observations merely to the amount of power and proportionate expense.

The force of traction of the horse, and the yearly cost, will remain so nearly the same, that for our present purpose we may consider them quite unaltered. Not exactly so with the locomotive engine.

All the parts of the machine must be made much stronger and heavier, and consequently more expensive for road work than for railway, and, therefore, the first cost will be greater—the wear and tear will also be greater, and as the work will be more variable, the consumption of fuel will be increased as well as the price; which, generally speaking, will be much less on a line of railway, than it can possibly be elsewhere.

Still all these circumstances will not influence the result so much as the increased effect of the weight of the engine. On a railway with the carriage, as now constructed, the force of traction is not much more than $\frac{1}{150}$ or $\frac{1}{200}$ of the weight moved; consequently, the power necessary to move the engine itself is not very considerable. On a road, however, this proportion is materially altered; here the average force required to move a well-constructed carriage cannot be estimated in practice, at less, even when the roads are in good repair, than $\frac{1}{25}$; the engine, according to the construction of the best locomotive engines now in use, will weigh, with its carriages and fuel, at least one-half ton, or 1120 lbs. per horse power, and $\frac{1}{25}$ of 1120 is nearly 45 lbs., which we have to deduct from the gross power of the engine, and which leaves only 121⅔ lbs. as the available power. The proportional expense of the horse and the steam-engine is now therefore about as 115 to 100, and this without taking into account the causes of increased expenditure already alluded to as regards the prime cost, the repairs, and the consumption of fuel. From these calculations it would appear, that even if mechanical power was found as convenient and applicable in practice as horse power, still no great economy can be expected from the employment, upon common roads, of small locomotive engines, such as the best of those now in use, and known to the public, unless it be in cases where other means may fail to produce some particular effect which may be required; if, for instance, a considerable velocity is necessary, the power of a horse is very nearly exhausted in moving his own body, and then there can be no doubt that a mechanical agent, in which power may always be exchanged for a proportional velocity, will have some advantages on a very good road which in fact approaches very nearly to a railway. But in every case in which velocity is not a principal object, as in the one now under consideration, and where, consequently, little momentum is acquired, and frequent thought slight obstructions occur, as on an ordinary road, an animal appears to possess decided advantages. He adapts himself admirably to the work, increasing or diminishing his efforts according to the variations of the draught, resting himself, as it were, and acquiring vigor where his utmost strength is not called for, and thus becomes enabled to make exertions far beyond his *average* strength where any impediment or obstruction is to be overcome. Indeed, he appears rather to increase the *average effect of his powers* by these alternations of exertion and comparative relaxation; and when it is considered that the draught will, in an ordinary road, frequently vary in the proportion of six or eight to one, and that these changes may succeed each other suddenly, the importance of such an accommodating faculty will be immediately appreciated.

By mechanical power, such as a steam-engine affords, these advantages are not easily obtained. Without great weight or rapid motion no momentum can be acquired; and the carriage itself, not being in rapid motion, and the necessary economy in weight precluding the use of a fly-wheel, any small obstruction will check, and perhaps totally stop the machine. For instance, supposing the carriage to be advancing steadily under the effect of a force of traction of 500 lbs., and that a stone or rut suddenly causes a resistance, which it would require 600 or 800 lbs. to overcome, a case by no means rare even on tolerable roads; if the impetus or momentum of the mass be not sufficient to carry it over this obstruction, the machine must stop until some increased power be given to it.

It is also to be remembered, that what we are accustomed, in practice, to consider as the average power of a horse, is the average excess remaining over and above that necessary to carry his own body; and that in all ordinary cases he is able to maintain and continue nearly the same exertions, although the comparative draught of the carriage be considerably increased. Thus, if the road be slightly muddy or sandy, or newly gravelled, the draught, as we shall see more accurately laid down when we come to the subject of wheeled carriages, will be double and even treble what it is on the same road when freed from dust or dirt; but the average power of the horse remains nearly the same, and, practically speaking, equal under both circumstances; that is to say, that the power necessary to move the weight of the horse's body, which forms no inconsiderable portion of his whole power, is not materially increased by a state of road which will even treble the draught of the carriage; consequently, the excess, or available portion of his power, remains unimpaired, and the full benefit of it, as well as of any increased exertions of the animal, is felt and is applied solely to dragging the load.

Not so with a locomotive steam-engine, because beyond the power necessary to perform the work of dragging the load, an additional power must be provided to move the engine itself. In other words, if an engine of ten-horse power be capable of dragging a certain load, the weight of this engine

forming a portion of the load to be moved, a corresponding portion of the power is unprofitably absorbed in moving it, and the excess, or remaining power, is alone available for useful purposes, and can alone be compared to the animal or horse power. Now, if the draught is augmented, as we have just supposed, by any sand, dirt or roughness of the road, or any other impediment, the force required to move the useless weight (of the engine) is proportionally increased; it may even, as we have stated, be doubled or trebled; and the whole power of the engine remaining the same, the surplus or remaining portion is considerably diminished, and that at the very moment when, as before stated, it produces only one-half or one-third the effect.

Moreover, if at any part of the road a power equal to twenty horses is required, the engine, as regards its construction, must be a twenty horse engine. It is erroneous to suppose that a steam-engine, because it is a high-pressure engine, can therefore, as occasion requires, be worked for any length of time beyond its nominal power, by merely raising the steam. Every part of a machine is calculated and arranged for a certain pressure and corresponding power, and that is a real power of it. It is optional to work at or below that power, but, if below, it will be to a disadvantage, and the bulk and weight of the machine will be as great as if it were always worked to its full extent, and both have to be carried over all those parts of the road where a far less power would be sufficient. The velocity of the carriage might indeed be increased, while travelling on the good and level portion of the road, but these alternations in the speed and power cannot be effected without a considerable degree of complexity, weight, and expense in the machinery, and as we are confining ourselves to the consideration of the case where velocity is not required, and might even be an inconvenience, the excess of power will be wasted.

These objections to the use of mechanical power, in certain cases, are pointed out, not as being insurmountable obstacles to the use of machinery, but as serious difficulties which, in practice, have not yet been overcome. In fact, there is not at present any practical substitute for horse power on common roads, and as far as the public is concerned, nothing has yet been done. We, therefore, must consider them as objections remaining to be overcome; and we are compelled to draw the conclusion, that, at the present moment, animal power (always confining ourselves to the question of the economical transport of heavy goods upon common roads) is superior to any mechanical agent, and that beasts of draught, and particularly the horse, are not only the most ancient but still remain the most advantageous source of power.

Long experience has pointed out various modes of applying animal power; but it is frequently ill directed, owing to the want of an adequate knowledge of the mechanical structure of the animal, and the manner in which he exerts his strength.

In the most powerful steam-engine, if too great a resistance be applied, or, practically speaking, if we attempt to make it do more work than it is calculated for, there is an immediate loss of power, in consequence of the diminution of velocity caused thereby; and if we continue to oppose a still greater resistance, we reach the point at which it is unable to overcome it, and it ceases to produce any effect. Again, a very small obstacle may be so applied as greatly to impede an engine of considerable power, or even to stop it altogether. The power of an engine is limited, and resistance must always be proportioned to it; and there is a proportion beyond which it is useless to go, and less than which would not absorb the whole force.

An animal is but a beautiful piece of machinery, and although perfect in its construction, and wonderfully accommodating in its movements, it still, like the engine, has a limited power, and has its peculiar modes of action, its strong and its feeble parts; and we must well consider its structure, to be able to apply the resistance in that degree, and in that manner which shall enable it to produce the greatest effect. The consideration of the comparative effects of the exertions of a man and a horse will at once exemplify this, and lead us more clearly to the knowledge of the peculiar qualities or faculties of the horse.

If a horse be made to carry a heavy weight rapidly up a steep ascent, or if a man be employed to drag slowly a heavy carriage along a rough road, the strength of both will be soon exhausted, and little effect produced; but if a man be made to carry a weight up a ladder, and if a horse draw a heavy carriage along a road, they will each produce a considerable effect: yet, in the former case, the horse and the man are as strong as in the latter, but their power is not properly applied, and is consequently wasted.

These different results are easily explained, by considering the mechanical structure of the two bodies, and the mode in which their muscular strength is exerted.

The action of pulling is effected in either case by throwing the body forward beyond the feet, which form the fulcrum, and allowing the weight of the body, in its tendency to descend, to act against the resistance applied horizontally, and drag it forward; as the resistance yields, the feet are carried forward, and the action renewed, or rather continued.

* * * * * * *

We shall here consider both the quality of the draught and the degree.

And first, it is to be observed, that although the weight of the animal's body is the immediate cause in the action of pulling, yet, as before stated, it is by the action of the muscles in advancing the legs and raising the body, that this cause is constantly renewed, and the effort continued. The manner, and the order of succession in which a horse thus lifts and advances his legs may, of course, influence the movement of his body, and ought therefore to be examined into: accordingly we find that many writers upon draught have touched upon this part of the subject, but they appear to have contented themselves with inventing in their closet the manner in which they conceived a horse must have moved his legs, rather than to have taken the trouble to go out of doors to see what really did take place, and, consequently, many have arrived at erroneous conclusions. The ancient sculptors, who generally studied nature so faithfully, either neglected this point, or otherwise our modern horses, by constant artificial training, have altered their step: for we find in the celebrated frieze, from the Parthenon at Athens, a portion of which, now in England, is more commonly known under the name of the Elgin mar-

bles, the only horses which are represented trotting, have both their legs on the same side of the body raised at once, the other two being firm upon the ground—a position which horses of the present day never assume while trotting.

In the case of these relievos, it is true that there are only four horses, out of more than two hundred, which are in the action of trotting, all the others being represented in a canter or gallop; and only two of these four are entirely in the foreground, and distinct from the other figures. It would not be safe, therefore, to draw too general a conclusion from this example alone; but we have another decided proof of the remark we have made, in the case of the four horses of the church of St. Marc at Venice.

Whether this was then the mode of trotting or not, it is certain that it is never seen to occur in nature in the present day; and indeed it appears quite inconsistent with the necessary balancing of the body, and was, therefore, more probably an error of the artist.

It perhaps may have been found difficult or troublesome to watch the movement of a horse's legs; but a very little practice will enable any body to verify what we are about to state: by keeping near the side of a horse that is walking, it will be easily seen that, immediately after the raising of either of the hind legs from the ground, the fore leg of the corresponding side is also raised, so that the latter leaves the ground just before the former touches it. If the fore legs be then watched, it will be seen that, immediately after the movement of either of these, the hind leg upon the opposite side is put in action, so that the order of succession appears to be in walking, as follows—1st the left hind leg, 2nd the left fore leg, 3rd the right hind leg, and 4th the right fore leg.

If the horse be now examined from a short distance, it will be seen that, when he is walking freely, the successive movements of the legs are at equal intervals of time, and that the muscular force of one limb only is brought into action at the same moment. But if a horse, which is dragging a load with some considerable exertion, be watched, it will be seen that he then acts longer upon his legs, and allows a less interval of time for raising and advancing them; and at the same time, the regularity of the movement is generally destroyed; the limbs on the same side generally being moved more simultaneously, or at nearer intervals of time than those at the opposite corners: thus, the muscular forces of two limbs are always acting together, the movement of the whole body is less continued and uniform than in the former case; but each impulse is more powerful, and a resistance, which would be too great for the muscles of one leg, is overcome by the united exertion of two. We shall point out, hereafter, the necessity of attending to this in the application of his power to draught.

In trotting, the action is of course quicker, and a less resistance will, as might be expected, cause the horse to move his legs at two intervals instead of at four equal intervals of time: indeed, a horse accustomed to go in harness generally acquires the habit of that action. There is this striking difference between trotting and walking: in walking, we have seen that the interval between the movement of the legs on the same side was less than the other interval of time: in trotting, on the contrary, the legs situated diagonally, or at opposite corners, move almost simultaneously. Owing to the velocity and the momentum which the body acquires in consequence of that velocity, in trotting fast, the successive impulses are less distinctly perceptible, and the movement more continued and uniform than in a slow trot, or in walking.

In galloping, the movement is totally different: the fore legs are thrown forward nearly simultaneously, and the hind legs brought up quickly, and nearly together; it is, in fact, a succession of leaps, by far the greatest interval of time elapsing while the legs are extended after the leap is taken: this is the position, therefore, which catches the eye, and which must be represented in a drawing to produce the effect of a horse in a gallop, although it is the moment when the animal is making no exertion.

The canter is to the gallop very much what the walk is to the trot, though probably a more artificial pace. The exertion is much less, the spring less distant, and the feet come to the ground in more regular succession: it is a pace of ease, quite inconsistent with any exertion of draught.

The consequence of these peculiar movements in the limbs of the animal is, that a succession of impulses is conveyed to the body; and when the movement is slow, and the body of the horse does not acquire any considerable impetus or momentum, the resistance should be *such as to receive each of these impulses, and leave the horse unrestrained in the intervals.*

It must, therefore, be a rigid resistance, void of elasticity.

It must not, however, be a constant, unremitted resistance.

For it is a well known fact, that, however powerful may be the muscles of a limb, they must not be kept constantly on the stretch. Thus we feel even more fatigue by standing than by walking, because one particular set of muscles is then kept constantly exerted. It is evident, therefore, that the resistance or draught must not be perfectly constant but should afford frequent opportunities of relaxing the efforts. Neither must it be a yielding resistance, as in that case the animal could not make any great exertion; for if he applied too much power, he would be liable to fall forward, and should he at any time fall short of the necessary exertion, he would be drawn back by the strain, and it would require a considerable effort to restore the motion.

If a horse be made to drag a rope passing over a pulley and descending into a well with a certain weight, say of 200 lbs. attached to it, it is obvious that he could not make an effort greater than 200 lbs. without instantly considerably increasing his velocity, which would be a waste of power; nor must he for an instant relax his efforts, or fall below that mark, for he would then be unable even to resist the pull, and would be overcome by the weight. Such an extreme case as this, of course, is not likely to occur often in practice, but the disadvantage of the principle is obvious.

An arrangement of this sort is, indeed, sometimes made use of, for raising the earth from excavations, or the materials of a building; but the exertion is continued only for a few seconds, or for a distance of not more than ten or twenty yards: if prolonged, the inconvenience would be seriously felt, as it is, to a certain degree, in towing canal

boats; the length and curve of the rope give an elasticity to the strain, and the necessity of keeping the rope out of the water, or from dragging along the towing-path, compels the animal to keep up a constant, unremitted pull, and that, too, in an oblique direction, so as to throw him into an unfavorable position. We accordingly find that, under these circumstances, the average work of a horse is equivalent only to about four-fifths of that given by Smeaton, Desaguilliers, and others, who estimated the power of the horse from the work done in a horse-mill, where the resistance is inelastic, and all circumstances favorable, with the exception of the circular path.

The disadvantage of this kind of resistance is well known, to carmen, though of course without consideration of the reason. A horse is said to pull better when he is close to his work, that is to say, when he is attached at once to the body to be moved, because every exertion he makes is then communicated at once to the mass; but the leader of a team, unless he keeps the traces constantly on the stretch, may frequently waste a powerful effort without producing much effect upon the carriage.

Another inconvenience resulting from harnessing horses in a team, or one before the other, is, that the leader, by tightening the traces, is continually relieving the strain from the body horse, and reciprocally the body horse from the leader; so that these horses labor under all the disadvantages of a long, elastic, and constantly yielding connexion with the load, which is not only fatiguing to them, but, in cases where the resistance is variable, prevents the full and united effect of their exertions being properly communicated to the carriage. For, if a slight obstacle, as a rut or stone in a road, checks the progress of the vehicle, the shaft-horse can immediately throw his whole weight into the collar, and the united effect of his strength and impetus is conveyed unimpaired to the vehicle, and forces it over the obstacle; but if any elasticity is interposed between the power and the resistance, as in the case of the traces of the leader of a team, the whole, or the greater part of the effect of impetus is lost, and that force, which, if concentrated in one effort, would effect the object, being lengthened into a continued and comparatively feeble pull, is insufficient.

If we wish to destroy the impetus of a body moving with violence, we receive it with a yielding resistance; the action of catching a cricket-ball exemplifies this perfectly; and therefore, if the full effect of momentum is wanted, all elasticity in the direction of the movement should be avoided.

We have entered rather fully into the consideration of this particular point, because the principle is not only applicable to the mode of communicating the immediate action of the moving power, but will be found also of considerable importance when we arrive at the subject of wheel-carriages.

A consideration of these various points brings us to this conclusion, that the draught ought neither to be constantly uniform or without remission, nor yet yielding or elastic: sudden shocks or violent changes in the velocity must also evidently be disadvantageous, as tending to distress and injure the animal.

Having determined upon the necessary quality of the resistance, we will proceed to examine into the quantity or the degree of resistance or draught, and the speed best adapted to the exertion of the animal. The useful effect of a horse, or the work done, must evidently depend upon three things, viz. the rate at which he is made to travel, *the power of traction he can exert*, and *the number of hours he can continue to work daily at that speed;* and where there is no fixed condition which determines any one of these, such as a particular load to be moved, or a certain velocity which it is desirable to attain, or a limited time to perform the work in, then the object must be to search for those proportions of the three by which, at the end of the day, the greatest quantity of work shall have been produced.

With respect to the first two, viz., the speed and power exerted, it will be obvious, that where a horse travels unloaded, the greatest distance he can go in any given time for several days in succession without injurious fatigue, is *the limit of his velocity:* on the other hand, the load may be so great, that he can scarcely put it in motion—this is the limit of his power: in both cases, the useful effect is nothing. But between these limits of velocity and power, there is a proportion which affords the maximum quantity of effect, and which, therefore, must be the most advantageous for the application of horse-power.

It has been asserted by theorists, and the theory appears to be supported by experience, that the velocity corresponding to this maximum, or that at which a horse working continually a certain number of hours per day will do the most work, is equal to half the extreme or limit of velocity of the same horse working the same number of hours unloaded; and that the force of traction corresponding to this speed, is equal to half the limit of his power. For instance, if six hours be the length of a day's work decided upon, and if a horse working that time can go six miles per hour unloaded, and therefore producing no useful effect, and supposing the limit of power of the same horse be equal to 250 lbs., it is found that he will do the most work in the same number of hours when drawing a load at the rate of half six, or three miles per hour; and half of 250 or 125 lbs. will be the strain corresponding to this speed. Our next step, then, must be to *find* these *limits:* now, the limit of velocity depends upon the length of time during which the speed is kept up; we subjoin therefore a table deduced from experiments, and which represents the proportion of the duration of labor and maximum velocity of the average of horses accustomed to their respective velocities.

	Hours.								
Duration of labor	1	2	3	4	5	6	7	8	10
Maximum velocity unloaded in miles per hour	14¾	10½	8½	7⅓	6⅔	6	5½	5¼	4⅘

This within the range here given may be considered as very nearly the law of decrease of speed by increased duration of labor; and at the first glance we see the great advantage of reducing the speed and prolonging the exertion. There are, however, many causes to limit the duration of a day's work of a horse. Tredgold, in his work on railways, before quoted, says: 'the time assigned

for the day's work of a horse is usually eight hours; but it is certain, from experience, that some advantage is gained by shortening the hours of labor; and we have observed, that a horse is least injured by his labor, where his day's work is performed in about six hours; where the same quantity of labor is performed in less than six hours, the over-exertion in time shows itself in stiffened joints, while the wearying effects of long-continued action become apparent, if the duration of the day's work be prolonged much beyond eight hours. Indeed, under the management of a good driver, a full day's work may be completed in the time before mentioned—six hours—with benefit to the health and vigor of the animal.'

We may be permitted, however, to abandon the idea of improving the health of the animal, or of rendering his business a pleasure to him—an attempt, the success of which is, we should think, very questionable, and content ourselves with endeavoring to check the barbarous practice of working horses to death either by overdriving or overloading them; and we shall, as is generally the case, consult our own interests and follow the dictates of humanity at the same time, by not injuring so useful an animal: and we think experience proves there will be no danger of doing this by working eight or nine hours a day. By referring to the table above, we see that the maximum velocity of the average of horses corresponding to eight hours' work is five miles and a half per hour, consequently, the rate at which he would travel when loaded is a little more than two miles and a half per hour. There is no doubt that some horses could conveniently travel faster; but as the speed must generally be governed by that of other horses, the average is, in this case, the rate to be adopted. The force exerted under these circumstances depending upon the quality of the horse, it is very difficult to obtain even an approximate value of it, unless the experiment be made upon each individual horse: it is fortunately, however, of no great consequence in practice, because if we feel sure that we are employing all the *power* we can command to the greatest advantage, it is not of any very great importance that we should know the *exact amount* of that power.

In comparing animal horse power with that of the steam-engine, we estimated it at about 125 lbs., but we believe that, with tolerably good horses, it may generally be taken at more than that.

We have thus far confined our attention to the cases where velocity, as well as duration of labor, was left to choice; this is far from being always the case. In stage-coaches, or other conveyance for passengers, speed is absolutely necessary, and it only remains to learn how that speed can be obtained with the greatest economy. The following table, extracted from Tredgold, will show the great reduction in the effect produced by increasing the velocity.

The first column being the velocity or rate per hour, continued for six hours per day; the second represents the force of traction of which the animal is capable; and the third, the comparative effects produced. A force of traction of 125 lbs. continued for six hours at the rate of three miles per hour being taken at the standard, and considered equal to the arbitrary number 1000.

Miles per hour.	Force of traction in lbs.	Effect produced.
2	166	888
3	125	1000
$3\frac{1}{2}$	104	972
4	83	088
$4\frac{1}{2}$	$62\frac{1}{2}$	750
5	$41\frac{2}{3}$	555
$5\frac{1}{8}$	$36\frac{1}{2}$	500

If, however, the hours of labor be lessened, taking the velocity corresponding to the greatest useful effect, the results will be much greater, and the velocity may be raised much higher, as will be seen in the following table.

Here the first column is the length of day's work, the second the best velocity corresponding to that time, or half the limit of velocity shown in table (1,) and the third column the comparative effect produced, the force of traction being in each case 125 lbs.

Duration of labor in hours.	Velocity, miles per hour.	Effect produced.
2	$5\frac{1}{4}$	578
3	$4\frac{1}{4}$	709
4	$3\frac{3}{8}$	813
5	$3\frac{1}{4}$	909
6	3	1000
7	$2\frac{3}{4}$	1063
8	$2\frac{5}{8}$	1110

To attain higher velocity, it is necessary still further to reduce the load, and the next table is calculated upon the supposition of the strain being only one-half the last, viz., $62\frac{1}{2}$ lbs.; this is about the average exertion of each horse in a four-horse heavy stage-coach.

Duration of labor, hours per day.	Velocity.	Effect produced.
4	$5\frac{1}{2}$	613
3	$6\frac{1}{3}$	534
2	$7\frac{1}{3}$	434
1	11	307

In mails or light coaches, where ten, eleven, and even eleven and a half or twelve miles an hour is attained, the average strain of each horse is barely 40 lbs., and the effect produced, or value of work done, not much more than one-half the above.

It must be remembered, that these tables are all calculated upon the supposition of the road being good, and the work such as not to cause any immediate injury to the animal, and is adapted only to the average quality of horses. They are not therefore at once applicable as data for calculations in all ordinary cases, but only serve to show the comparative forces which may be exerted under different degrees of speed. The results or effects of this force will always be influenced by the quality of the resistance as we have already observed in the cases of slow travelling, but in rapid travelling the power is much more expensive, owing to the great loss which we see by the tables is sustained by increased velocity; and it is, therefore, the more important to study well the means of applying the power in question.

In this rapid travelling, the bad consequences of a uniform and constant strain is still more felt by the horses, and the necessity of occasional relief is still more urgent than at low velocities. It is uni-

versally admitted by horse proprietors and post-masters, whose interests make them peculiarly sensible on this point, that a flat piece of road is more destructive of horses than the same length of road where gentle rises and alternate flat and swelling ground occur; and that a long hill is easier surmounted where there are occasional short levels, and even descents, than when the whole is one uniform ascent.

ANOTHER REMARKABLE BORED WELL IN FRANCE.

From Waldie's Journal of Belles Lettres.

Artesian wells have been very successfully constructed in some parts of France. A letter from M. Jauburt de Passa to Viscount Hericart de Thury, describes a bored well, remarkable for the abundance of water which it supplies. It was made by M. Durand, two leagues south-east of Perpignan.

The sound, after penetrating to the depth of eighty feet, through alternate beds of marl and clay, entered a bed of sandy marl, three feet thick, whence issued a jet of water, very clear, but, from the peculiarity of its taste, unfit for drinking. Its temperature was 14 degrees 5 Reaumur, (=65 Fahrenheit,) and it rose from three to four feet above the surface.

A second boring, undertaken at a distance of six feet from the first, gave, at the same depth, a jet of water; but the first jet diminished, and the quantity of water from both, was less than that which first issued from the former. The boring of the latter was then continued to the depth of one hundred and forty-five feet, when the sound began to sink of itself, and when precipitately withdrawn, the water rushed up, to the height of five feet, and astonished all by its abundance and force. No obstacle could restrain it. No direct attempt was made to determine the maximum height to which it might rise, but fifty feet was decreed to be fully within the limits of its ascending force.

At the time the letter was written, several weeks after the first issue of the water, it continued to flow with the same violence, and with rather increased quantity. From the dimensions and velocity of the current, it appeared to supply four hundred and thirty gallons per minute, or two thousand eight hundred and eighty cubic metres per day. A leaden weight of eight pounds, supported by a string, being placed in the tube, was rapidly thrown out by the water.

The water, which, at first, had a peculiar taste, but not disagreeable, is now very limpid and insipid, and its temperature 60 degrees Fahrenheit. The total expense of the well was two hundred and sixty-three francs.

[The foregoing extract is an interesting addition to the statements lately presented in this work of the effects of boring for water. Besides the great volume of water discharged, and its prodigious force of ascension, there are two other facts worthy of notice in this short account. The first is, that the second boring, which was so near the first that it may be considered as merely doubling the size of the aperture, served not only to diminish the force of ascension, but also the volume of water discharged. Another matter deserving notice is the small expense at which this object was attained, only about $50. There are not many considerable farms where thrice this sum would not be profitably expended for an overflowing fountain, or well of pure water, though furnishing but a very small supply—and a well like this, in many situations would be worth many thousands of dollars. It is surprising that this discovery is so slow in coming into use. If water may be thus obtained in most localities, no imagination can now fix limits to the future results and value of the discovery. Abundant supplies of pure water will not only be obtained for drinking and household purposes in places now suffering under its deprivation, but possibly in sufficient quantity and force to act as a *motive* power. In the few attempts made in this country, it is more than probable that the boring never was made to penetrate deep enough to reach the most abundant sources of water. In the tide water region of the southern states there would be found no rock nor any serious impediment to the borer, at least for any depth yet known—and therefore, no where could such experiments be made at less cost, nor with more useful results, if successful. It is highly desirable that the government should encounter the expense of such an experiment, by causing a boring to be made to the greatest possible depth.

The subjoined letter was an answer to our written inquiries made of an old friend. Though not designed for publication, there is no other reason why its contents should be kept private—and we hope that our friendly and intimate relations will serve with him as a sufficient excuse for taking this liberty—which is one that we have rarely used—and certainly never mean to publish any letter, if it can be supposed that the writer would have objected.]

THE BORED WELLS OF ALABAMA.

To the Editor of the Farmers' Register.

Marengo County, Alabama, Dec. 20, 1834.

Your letter making inquiries about the bored wells, or fountains, and the prairie lands &c. of this section of country was received a few days since, and as I feel better to day than for several past, (although I now write in bed,) I will now endeavor to give you all the information I have on the subject. When I arrived in this country in January 1832, I do not think I heard of a single instance where success had attended the efforts in getting water in this way, although many had attempted it. But an ingenious blacksmith (a Yankee,) turned his attention to the business, and his exertions were soon crowned with success. He says his success had been mainly owing to his having a hole in the lower end of his shaft, or rather the first shaft that is attached to the auger, the hole communicating with the auger itself, and is made by gun barrels being screwed one on the other. This hole, he says, prevents too much suction when the auger gets a very great depth into the rock. He and his company have succeeded in raising the water above the surface in this county, and in Greene, and in some instances it rises more than six feet above the surface. The quantity I am told varies almost in every instance, according to the depth of the lime-stone rock

—the deeper that is, the less the quantity and the warmer the water, but it is easily cooled by digging a cistern close to the bored well into the lime-stone rock—which soon makes the water as cool as the best springs in Virginia. The quantity I am told varies from the same cause, from 500 to 2000 gallons in twenty-four hours. I have heard of no instance in which complaint is made of there not being water enough for all plantation purposes. The bored wells cost from $250 to $500, and even $600. I have only heard of two instances in which this man failed to get the water over the top of the surface, and they are both very close to me. In one of them, which is 560 feet deep, he states there was a split in the rock sixteen feet from the surface and the water would rise no higher. But by digging a common well a few feet from the bored one, and inserting a tube from one to the other, he succeeded in getting into the dug well a plenty of water: but it does not run over—yet there is plenty of water, and the gentleman who employed him paid the full amount. In the other case, he bored 625 feet, and said he had to prepare other fixtures, &c. before he could go deeper. In this well water rose to within fifteen feet of the top: but for this he will not be paid, until he gets the water to flow out—which he says he will yet do. His fixtures, augers, &c. are ingenious, but simple.

They have invariably to bore through the soft lime-stone rock before the water rises, and into free-stone, coarse sand, and sometimes through several strata of flint-rock, before enough flows up: but generally, after the sand is well cleaned out, enough comes up to satisfy the owner, and they give up the job as finished. No seasons seem to have any effect upon the quantity—and the water is invariably "free-stone," and transparent as crystal. But it seems that where the well is close to the river there is a saline taste. This I have heard of in two instances at least—and they are the only ones that I have heard of being bored close to it—for near the river the land is sandy, and they generally have springs. It appears also there is no calculating from experience what the depth of the well will be before it is bored, as they often vary very much in a short distance. It only seems certain that they are deeper near Demopolis, in this county, than any that have been bored in Greene county. It is the opinion of the borer that I have mentioned, (and I can ussure you he is a *smart fellow*) and it is also mine, that the free-stone, sand and rock where the water flows from, was the bottom of the ocean when the marine deposites, the shells, and other matters that now form the lime-stone rock were made upon it: but this you know must be conjecture.

I must inform you that the prairies in Greene county are much larger than in this immediate neighborhood, where the immense rich cane lands abound—and they lie from fifteen to twenty miles higher up the river; there, I understand, the wells are not so deep by several hundred feet as here.

The diameter of the auger that the man whom I have spoken of uses, is about three inches—and it is my opinion no more water would rise by using a larger one: but this is only opinion. In boring, they often encounter sulphur balls, which are so hard as to almost resist any tool they can make: and in one instance, (that of the deep well I have mentioned,) the man informed me, he encountered and went through a stratum of hard load-stone. I must inform you also, that this tract of rich lime-stone land is but of small dimensions—not, I am sure, in one way more than from fifty to sixty miles, and the other, twenty or thirty; and even in that, there are spots of sandy land that have fine springs on them, which are always of free-stone water, or most generally so. Even in the strong lime-stone lands near the creeks, where the land is broken, there are some good springs.

GYPSUM REDUCED TO POWDER BY POUNDING OR BURNING.

To the Editor of the Farmers' Register.

Brookfield, (Henrico,) 10th Feb., 1835.

On the farm which I superintend, it is in contemplation to use a large portion of gypsum, both on the ensuing crop of corn and grasses; not having a machine for breaking it, we are under the necessity of performing this operation with mallets or wooden pestles shod with iron, which renders it both tedious and laborious. By heating gypsum to a red heat, its watery portion is dissipated, and it readily falls into a powder. I should be glad to know from yourself, or any of your numerous readers, whether gypsum, to be applied as a manure, and heated to an extent sufficient to dispel the water which it contains, would lose any of its good qualities as a manure? If none of its good qualities would be lost by being thus heated, it would be an immense saving of labor to reduce it to a powder by this means, over the mode just alluded to.

That sulphate of lime or gypsum is a valuable manure, is generally admitted, particularly on clover and grasses, and I think, also on corn, as by examination, it will be found to exist in the stalk, and to a large extent, in the cob of corn. In cases where it has been applied without any apparent benefit, the probability is, that there was a sufficient portion of it already existing in the soil, it being contained in the dung of all animals fed on grass, and consequently, furnished by the manure in the common course of cultivation. The difficulty, in ordinary cases, of getting it reduced to a powder, deters many from availing themselves of the important benefits usually resulting from its use.

A. N.

[The remarks made previously at page 603, in regard to the effect of heat on gypsum will serve in part to answer the inquiry presented in the foregoing letter, since received. A red heat will not affect the chemical union of the sulphuric acid and lime, and will serve only to drive off the water, which forms the third component part of gypsum. A much lower degree of heat will dispel the water either partially or totally, and so far affect the texture of the stone as to render its pulverization comparatively easy. It is a very important question, which could soon be solved by careful experiments, whether burning lessens the fertilizing power of this substance—important, not only to save labor, if it is not thus injured, but to avoid being cheated by gypsum being burnt by salesmen, if that mode of reducing it is indeed injurious. We again request

attention to this question, and from chemists, as well as from practical farmers.

In the remarks just referred to, we stated from memory only, that gypsum was soluble in about 600 times its quantity of water. Davy and Cleaveland, both state the quantity to be 500, and Thomson, 460 times the quantity of gypsum dissolved—cold water being always understood.

A statement of the component parts may be new and useful to many readers. Sulphate of lime, or gypsum in a perfectly pure state, consists of the following proportions:

According to	Sul. acid.	Lime.	Water.		Parts of Gypsum.
Davy, - - - - -	75	55	34	make	164
Thomson, - - -	100	72.41	55.8		228.21
Bergman, (quoted by Cleaveland,)	46	32	22		100

According to all of these authorities, it will be seen that the lime is less than one-third of the whole quantity of gypsum, and considerably less than the amount of sulphuric acid with which it is combined.

As presented by nature, the purest gypsum is seldom free from some small contaminations of carbonate of lime, alumine, silex, and oxide of iron—and these substances enter more largely into all the gypsum commonly used as manure—though not to so great an extent as to have any considerable effect in lessening its strength—or affecting the value of the stone, unless by rendering it more difficult to be pulverized. The foreign substances in the gypsum of commerce, (the carbonate of lime especially) often serve to render it a better cement after calcination—as a proportion of quicklime is necessary for this purpose.

The last No. (for October 1834,) of the *Annales de l'Agriculture Française*, which has been received since the foregoing remarks were in type, contains a passage which shows that the effect of burning gypsum to reduce it for manure, has engaged attention in France—where however, the manure operates much less powerfully than in the United States. One of the premiums offered by the *Société royale et centrale d'agriculture du departement de la Seine-Inferieure*, for the year 1836, is the following:

"To determine the best method, and the time most favorable for plastering clovers and plants for forage, and under what circumstances the preference ought to be given to plaster burnt, or plaster not burnt. The prize will consist of a medal of gold, of the value of 150 francs."

[It is altogether unknown to us who is the author of the following concise review—but he is evidently one whose modes of thinking and of investigation are such, that his approbation must be highly prized where bestowed, and his strictures allowed their full and proper weight. It is not only for these reasons that the article is here republished, but because the reviewer has directed his readers' attention particularly to some of the novel positions in the *Essay*, which, if true, certainly are of high importance, and which if unfounded, may be, and ought to be, overthrown.]

From the Genesee Farmer.

"ESSAY ON CALCAREOUS MANURES."

This is the title of a duodecimo volume of 242 pages, published more than two years ago, by Edmund Ruffin, editor of the *Farmers' Register* in Virginia. It is more particularly designed for the Tertiary Formation of the maritime states; but we have no hesitation in saying that it ought to be read by every farmer who wishes to understand the nature of manures, and to know how to apply them to the best advantage. It is an original work of great merit. The author is not a mere theorist, proposing plans for others to follow; but a practical farmer who has thoroughly inquired into the causes of the sterility that has long overspread the tide-water districts; and who has led the way in a course of improvements which must materially change the condition of that country.

His chemical experiments on various soils have produced some very unexpected and surprising results. For instance: he finds a total absence of calcareous earth in all *their* poor soils, and also in many rich soils: and it is particularly worthy of notice that some of these specimens were obtained in the near vicinity of limestone rocks. Our author says, "before the first of these trials was made, I supposed (as probably most other persons do) that limestone soil was necessarily calcareous,* and in a high degree." His experiments have shown however, that this is a mistaken notion. One sample was taken from a piece of land so rocky with limestone as to be unfit for the plough, and yet one thousand grains of the soil yielded only one grain of calcareous earth. Various other specimens have shown a total destitution. Brown loam from the Sweet Spring Valley, remarkable for its extraordinary productiveness and durability, which must have been often covered and saturated with mineral waters holding lime in solution—yielded not a particle of calcareous earth. The same result was obtained from various soils, some lying on the surface of limestone; others taken from between masses of that rock; and our author after detailing the particulars, remarks: "thus it appears that of *nineteen* specimens of soils, only *four* contained calcareous earth, and *three* of these in *exceedingly small* proportions. It should be remarked that all these were selected from situations which from their proximity to calcareous rock, or exposure to calcareous waters, were supposed most likely to present highly calcareous soils. If five hundred specimens had been taken without choice, from what are commonly called limestone soils, the analysis of that whole number would be less likely to show calcareous earth, than the foregoing short list."

We confess these results were new to us; and our curiosity was excited to ascertain if the rich limestone lands of the Genesee country were in the same condition. On selecting specimens from an old field, at the different depths of *four* and *seven* inches, which we should not hesitate to call

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* The term "calcareous" should be limited and restricted to carbonate of lime, lexicographers to the contrary notwithstanding. We are supported on this point by mineralogists who know the importance of precision in language, and who use the terms *calcareous alabaster* and *gypseous alabaster*, altoough the base of each mineral is *lime*.—GEN. FAR.

a limestone soil, to our surprise, these specimens when treated with muriatic acid, gave no indication of calcareous earth; and on procuring others from a dark rich loam amongst broken limestone partly disintegrated, the effervescence was but barely visible. On digging down into the subsoil however, and subjecting a specimen to the same treatment, the carbonic acid foamed in the glass. We are therefore prepared to adopt the conclusion of our author, that calcareous matter when mixed with the soil, soon becomes converted into the oxalate of lime* and the unchanged state of *that* subsoil, from not having been penetrated by the vegetable acids, may be offered as additional evidence.

He has not left this opinion however, unsupported by direct experiments. To an acid soil, full of vegetable matter, he applied fossil shells at such a known and heavy rate as would have given to the soil (by calculation) at least three per cent. of calcareous earth to the depth of five inches. After the field had been cultivated six years, the soil was examined; and in the first experiment 1000 grains only yielded eight of calcareous matter; the second experiment only seven grains; and in the third, 1500 grains produced seventeen and a half. The average is thus considerably less than one per cent.; and shows that more than two per cent. of calcareous matter had undergone a new combination.

As a sample of our author's manner of treating a subject, we select a "Note" in the appendix on the application of gypsum. In the lower parts of Pennsylvania, *liming* has been found to insure the efficacy of that wonderful manure; and some of our readers may recollect that our correspondent J. Spicer (Vol. 2, p. 165,) has derived great benefit from mixing *ashes* with it before sowing. How these operate, we think the "Note" (which follows) will satisfactorily explain.

"I do not pretend to explain the mode of operation by which gypsum produces its almost magic benefits: it would be equally hopeless and ridiculous for one having so little knowledge of the successful practice, to attempt an explanation, in which so many good chemists, and agriculturists both scientific and practical, have completely failed. There is no operation of nature heretofore less understood, or of which the cause, or agent, seems so totally disproportioned to the effect, as the enormous increase of vegetable growth from a very small quantity of gypsum, in circumstances favorable to its action. All other known manures, whatever may be the nature of their action, require to be applied in quantities, very far exceeding any bulk of crop expected from their use. But one bushel of gypsum, spread over an acre of land fit for its action, may add more than twenty times its own weight to a single crop of clover.

"However wonderful and inscrutable the fertilizing power of this manure may be, and admitting its cause as yet to be hidden, and entirely beyond our reach—still it is possible to show reasons why gypsum cannot act on many situations, where all experience has proved it to be worthless. If this only can be satisfactorily explained, it will remove much of the uncertainty as to the effects to be expected: and the farmer may thence learn on what soils he may hope for benefit from this manure—on what it will certainly be thrown away—and by what means the circumstances adverse to its action may be removed, and its efficacy thereby secured. This is the explanation that I shall attempt.

"If the vegetable acid, which I suppose to exist in what I have called acid soils, is not the oxalic, (which is the particular acid in sorrel,) at least every vegetable acid, being composed of different proportions of the same elements, may easily change to any other, and all to the oxalic acid. This, of all bodies known by chemists, has the strongest attraction for lime, and will take it from any other acid which was before combined with it—and for that purpose, the oxalic acid will let go any other earth or metal, which it had before held in combination. Let us then observe what would be the effect of the known chemical action of these substances, on their meeting in soils. If oxalic acid was produced in any soil, its immediate effect would be to unite with its proper proportion of lime, if enough was in the soil in any combination whatever. If the lime was in such small quantity as to leave an excess of oxalic acid, that excess would seize on the other substances in the soil, in the order of their mutual attractive force; and one or more of such substances are always present, as magnesia, or more certainly, iron and alumina. The soil then would not only contain some proportion of the *oxalate of lime*, but also the *oxalate* of either one or more of the other substances named. Let us suppose gypsum to be applied to this soil. This substance, (sulphate of lime) is composed of sulphuric acid and lime. It is applied in a finely pulverized state, and in quantities from half a bushel to two bushels the acre—generally not more than one bushel. As soon as the earth is made wet enough for any chemical decomposition to take place, the oxalic acid must let go its *base* of iron, or alumina, and seize upon and combine with the lime that formed an ingredient of the gypsum. The sulphuric acid left free, will combine with the iron, or the alumina of the soil, forming copperas in the one case, and alum in the other. *The gypsum no longer exists*—and surely no more satisfactory reason can be given why no effect from it should follow. The decomposition of the gypsum has served to form two or perhaps three other substances. One of them, oxalate of lime, I suppose to be highly valuable as manure: but the very small quantity that could be formed out of one or even two bushels of gypsum, could have no more visible effect on a whole acre, than that small quantity of calcareous earth, or farm-yard manure. The other substance certainly formed, copperas, is known to be a poison to soil and to plants—and alum, of which the formation would be doubtful, I believe is also hurtful. In such small quantities, however, the poison would be as little perceptible as the manure—and no apparent effect whatever could follow such an application of gypsum to an acid soil. So small a proportion of oxalic acid, or any oxalate other than of lime, would suffice to decompose and destroy the gypsum, that it would

* This accords with the assertion of the Earl of Dundonald in his *Connexion of Agriculture and Chemistry:* "Much of the oxalate of lime will be formed by adding calcareous matter to ground abounding with plants of sorrel or other vegetables containing the sorreline or oxalic acid." He has referred to no experiments however, in proof of this opinion. GEN. FAR.

not amount to one part in twenty thousand of the soil.

"Why gypsum sometimes acts as a manure on acid soils, when applied in large quantities for the space, is equally well explained by the same theory. If a handful, or even a spoonful of gypsum is put on a space of six inches square, it would so much exceed in proportion all the oxalic acid that could speedily come in contact with it, that all would not be decomposed—and the part that continued to be gypsum, would show its peculiar powers perhaps long enough to improve one crop. But as tillage scattered these little collections more equally over the whole space—or even as repeated soaking rains allowed the extension of the attractive powers—applications like these would also be destroyed, after a very short-lived and limited action.

"Soils that are naturally calcareous, cannot contain oxalic acid combined with any other base than lime. Hence, gypsum applied there, continues to be gypsum—and exerts its great fertilizing power as in the counties of Loudoun and Frederick. But even on those most suitable soils, this manure is said not to be certain and uniform in its effects—and of course more certain results are not to be looked for with us. I have not undertaken to explain its occasional failures any more than its general success, on the lands where it is profitably used—but only why it cannot act at all, on lands of a different kind.

"The same chemical action being supposed, explains why the power of profiting by gypsum should be awakened on acid soils after making them calcareous—and why that manure should seldom fail, when applied mixed with very large quantities of calcareous earth."

For the Farmers' Register.

A NEW MODE OF CULTIVATING CORN MIXED WITH OTHER CROPS.

For several years I have practised a plan of saving my corn crop, in the execution of which, I consider myself much benefited, viz. in diminishing the labor usually bestowed in preserving that important crop, securing a large mass of excellent forage that would otherwise be lost, and providing the means of making a mass of valuable manure, ("Arator's" gold dust, and I find by experience, mine also)—and as you invite communications on agricultural operations, I will give you the detail. In addition, by my mode of cultivating my land, I find that my grain is much superior to my neighbors, who follow the old beaten tract, "the good old way."

Previous to commencing the pursuit of agriculture, I took a course which common sense would dictate in all human pursuits: I read all I could on the subject—reflected much—and observed the practice of practical men, and especially endeavoring to obtain from them the *why* and *wherefore* of all their operations. I pursued the cultivation of the earth because I delighted in it—and consequently I rarely "called on my man Tom," but became the "man Tom" myself, and directed and superintended all the operations of my farm—and among other notions I took up, there was this one, that the man appeared to me ridiculously inconsistent who would follow one pursuit, and try to excel in another: and in addition, such is my natural and acquired disposition, that if I had determined to follow picking up old rags, I would try to excel in it. I had but little business at the store, less at the tavern or grog shop—and at elections I went merely to give my vote. My farm was and is the place that "gives me plenty to do." and to it I gave my time—my bodily and mental exertions principally.

At an early day I adopted as an axiom, that labor wisely directed, would endeavor to secure the best possible return from the earth, for that bestowed on it, and that any mode of cultivating the soil which eventuated in its depreciation, was, and should be with me, inadmissible; and if I could not succeed in a mode of cultivation that would yield me *money-making* crops, and permit my land to be advancing in fertility, I would abandon the pursuit. Fortunately for me, a little arithmetical adding and subtracting, made it perfectly evident, that however extravagant the interest I might be getting for the use of capital, yet if that capital was annually depreciating, it was a wretched business.

After forming this opinion, I need hardly add that it was determined by every means in my power, to get into a most efficient manuring system, combining every possible economy and convenience. I bought some good cattle, sheep, hogs, and goats, and found that by a judicious management of them they became a source of profit, and above all, they secured to me the basis of an accumulation of manure. Adopting also a rotation system, I found it added prodigiously to my means for the improvement of my land, and stock, and manure. To preserve in the best manner, every thing that had the semblance of what is called "ruffage," (or offal matters of the farm) consequently became a *desideratum*, and here I put into full operation what is usually termed *economy*.

You could just as soon have found a large full ear of corn lying on the ground around my barn or stables, as a shuck, and equally would you be puzzled to find a corn stalk in my field. "Save all," was my motto. Following up this theory, I soon had large heaps of manure, and had the pleasure of realizing my productive system of husbandry. To arrive at that part of my theory, viz: that the mode of cultivating any given quantity of land that secured to the cultivator the greatest return for the labor bestowed, that the same quantity of land could be made to yield, was the one that sound wisdom would pursue—and certainly the one most profitable. I soon found that a correct system of mixed crops must be resorted to—and to make this mixture judiciously, was an important item in my agricultural course; and to secure the heavy crops or large returns for the labor bestowed, that I had anticipated, I had previously settled that manure must be given to aid in the production of this mixed cropping, as also to secure another of the two great objects which I kept steadily in view, viz: the improvement of the soil. On every view I took of the subject, I was always brought back to this point, and a complete manuring system presented itself uniformly as the key to all successful agricultural pursuit. In the language of that book which contains so many admirable maxims for the wise direction of human life, I went into a system of making manure "with all my might."

In my rotation cropping system, I manure only

for the corn crops, and for this one with long slightly fermented, or rather decomposed manure, but heavily. If I can get the vegetable substances which principally enter into the composition of my manure heap, well saturated with the liquid produced by the animal excrement, and plenty of it into the soil, well turned under before any evaporation can take place, all with me is well—no after-cultivation of that crop brings it to the surface during that season. Pursuing the same system, I have each year one shift resting, after which year of rest, this field, going through the following course, has to work out my corn crop. During that year nothing goes on this field—it is a positive rest: and from the quantity of vegetable matter which grows on it, and which ultimately goes into the soil, it is also a year of restoration.

My corn field this year, 1834, was ploughed deep in September 1833, and the mass of vegetable matter then found on it well turned under, and rye sown on and harrowed in—the harrow going with the furrow—half a bushel of seed to the acre. The rye gave me a fine bite for my young hogs, and sows with pigs, and calves, and a few milch cows, from the 15th of November to the 15th of February, when every thing was removed from the field. On the first day of April the rye was sufficiently rank, and was well turned in; an honest manuring from my dung-stead having been spread on it previously, and on which also was put a decent coat of swamp mud—and well turned under; which last operation, from the previous management, was not hard to effect.

In spreading the manure at this period, the rank rye was pressed down, and with a well constructed barshare plough, was easily turned under as deep as required. A coat of lime was now given, and which was mixed with the soil by a short wooden tooth harrow—the harrow going with the furrow that turned under the manure, and which prepared the field for being laid off in straight rows, at five feet by three, running the three feet furrows first, just sufficiently deep to mark the ground, and not disturb the manure—the five feet furrow running with those that put under the manure, and as deep made with a half-shovel to receive the seed. In dropping the seed, it was done with care, so as to have the grains as nearly as possible in a row; and with little care after thinning, and permitting only the two best plants out of the three dropped to stand, made the after plough cultivation easy and convenient, the ploughman being enabled, without danger, to run close to the stalk, saving much hoe labor. After the corn was planted, (indeed while planting) a furrow was run in the middle of the rows, into which over one-half of the field rice was dropped thick in the drill, the other half retained for peas to be drilled in the same way. The corn and rice were covered with a small board, attached to a light Scooter plough stock. On the first ploughing of the corn, and which was equally a ploughing of the rice, and the dressing that followed with the hoe, the earth was slightly drawn on the three feet intervals between the hills of corn, on two sweet potato sets, the red or bunch (the latter preferred on account of their having almost no vine) dropped and covered. In the hill of corn, one pindar (pea nut or ground pea) was dropped, and covered also. After drilling the balance of the field, between the rows of corn, in peas, my planting was now finished. It will now be seen, that I had nearly two and a half feet to plough in, or rather stir the ground in, between the rows of corn and rice, and corn and peas, one way of the field.

To prevent premature alarm to your readers, permit me here to say, that my security for success in all those plantings, was the after mode of managing the corn—and which, I think, completely exhibits the value of this mode of cultivating land. Here I will anticipate another difficulty with some, viz. the prodigious trouble and labor I was at, in my manuring for this crop; by assuring them, in time, that this manuring was to serve three more years of heavy crops in my rotation system, and for that purpose was found ample.

The ground was well tended—the potatoes grew sufficiently until the corn was removed; the rice also; the pindars and peas were at home. The ground now easy to plough, or rather stir, (for with me no turning up or over in the hot blazing sun season) from previous management, was stirred with small brisk walking mules, and careful ploughers, before each of whom, a premium for excellence of execution was held up. The hoe hands had the same inducement. The mules were well taken care of, each one and his driver being bound together by the strongest ties of interest—every thing, as well as the ground, was stimulated to struggle for success. In tending, the Scooter was the only plough used.

As soon as the first two or three blades on the corn seemed to invite the hand of economy to save, I went through the field and stripped and brought them home, throwing them in bulk under a large shed, turning twice over, and in a few days packing away, sprinkling with salt while stowing away. About the time that I found the balance of the blades inviting to a pulling, the shuck on the corn assumed a yellow appearance, and the corn itself had become pretty hard, and I now prepared by one *coup de main* to "save all"—and this I effected as follows. Four strong hands cut the stalk at the ground, each taking two rows, and laying down, evenly, as cut, (viz. the butts;) on going through, they hung their knives in the scabbard, each man gathering his two rows, and placing in heaps along the centre row. About as fast as this was effected, a wagon with low wheels, and long coupled, on which was a frame fitted for the purpose, passing along, taking up the corn, and laying it carefully on the butts together each layer, and passed to the barn lot, which was well ploughed up, and where the corn was put in shocks, shoving the butts into the soft ground while stacking, spreading well at the bottom, putting the stalks of about sixteen to twenty hills to the shock—and let stand ten days to cure. These small shocks, or stacks, were tied at the top by a wisp of rye straw. This business, as also the cutting, was not arrested by a moderate rain—if any thing, from experience, the latter preferred.

As soon as the field was thus cleared, I proceeded with the Scooter and hoe, and left it in fine order, giving all a last dressing—after which, all the remaining crops grew off rapidly. My corn was admirable, say fifty-two bushels to the acre. By the removal of the corn, the remaining articles had full and fair play, and as much room as they required, on such land as they were now

found in. It must also be recollected, that about the time the corn was removed, was the usual time for potatoes and rice to grow off, as also the pea crop. The rice was cut in the usual time: it could not have been exceeded—having so much room after the corn was taken off, forty some odd bushels of shell rice were made to the acre. The potato hills universally cracked open—they were superior, and the pindars as usual. The bunch and red potato, produced by this mode of management, remarkably well, filling the ground around the hill, and finding the earth containing so much food for their roots, they spread astonishingly. There appears to be no interference between the pea and potato vines, judging from production, although such near neighbors. Better peas or rice I never made by any other mode of planting. The pea crop I save by pulling up the vines, and curing in the fields, carrying home and putting in rail pens, sprinkling with salt as packing away—a good floor to the pens preserves the salt.

The prodigious advantage I derive from the stalks of corn saved in this way, as also the shuck, will be best understood by a communication in the Baltimore Farmer, to which I beg leave to refer, and which use of those parts of the corn crop amply compensates for a little shrinkage in the grain, if any. The manure heap fully settles the account, as also some fine steers, sold annually in the form of work oxen, a few pair of which I have trained to labor on arriving at the age of two years, and which article of sale I find goes off readily. The mass of offal I have from a twenty acre field, planted and tended in this way, is incredible, in stalks, shucks, fodder, peas, and pea vines, rice straw, and lastly, potato vines—and each, saved in my way, of superior quality. In addition, the advantage to the soil of being so much shaded during the intense summer heat, and the return of the pindar vines, and the rice stubble, and potato vines, if not cut up and carried home and fed away. The potatoes I dig up with a three pronged hoe fork, carry home and feed away to my fattening hogs, who are by this time in a dung-stead of their own, yielding, by being well littered, a rich contribution of the "gold dust." The pindars, and balance of the potato roots, go to the sows with pigs, young hogs, &c. —if a mast year, putting them in at night and out in the morning—if no mast, putting them in all day, and penning on plenty of leaf litter during the night, and which makes them count something in the way of the next crop.

My corn remains ten or twelve days in shock, then stowed away under sheds, in barns, &c. For the after management, I beg leave to refer to the paper before alluded to.

It is on the succeeding crop, that my trouble, as it is called, will show itself, and which you can have if desired, from

AGRICOLA.

Clarke County, Alabama.

COST OF A YEAR'S WORK IN USING WATER-BORNE MARL—SAVING CORN FODDER.

To the Editor of the Farmers' Register.

Charles City County, Feb. 4th, 1835.

I have delayed much longer than I intended, in giving you an estimate of my last year's work in the transportation of marl. The pressure of business which is usual with me at the commencement of every year, must be my apology.

Our work began on, or about, the 25th of March, and ended on the 24th December, a period of eight months. The labor employed was the same as the preceding year* two men and a boy, with the exception of the first two months, when the assistance of the boy was unavoidably withdrawn. The wages of the men were eight dollars per month, and the boy's three dollars and fifty cents. The quantity of marl transported was seventeen thousand bushels. Our business was necessarily suspended for twenty days in repairing our frail bark, in the month of October. The distance is fifteen miles. I shall not attempt to give any estimate of the expense of hauling from my landing, and scattering the marl, as you have it already at hand, and can easily add it if you think it necessary.

To hire of laborers, - -		$152 50
Food for laborers, - - -		60
Repairs of vessel, - -		40
Interest on first cost and fixtures,		18
		$270 50
By 17000 bushels of marl at 1 $\frac{6}{10}$ cents per bushel,	$272	272
		1 50

Thus showing that the expense of transportation alone falls under one cent and six-tenths per bushel. It seems to me wonderful, that so much preference should be given to oyster shells, by those convenient to water. I have used both, and greatly prefer the marl; first as being the cheapest —and secondly, as yielding a more immediate return for the labor, which is one of the most desirable objects to be attained in all improvement. I am still laboring under great disadvantage in regard to the landing of the marl on my shore. Nearly one-third of each load requires to be shifted to a smaller vessel, to enable the larger one to reach the wharf with the remainder, which still convinces me that the digging and water carriage could be reduced, under more favorable circumstances, to one cent per bushel.

I made an experiment the last fall, the future usefulness of which I hope to see realized. Instead of stripping the corn blades from the stalk as usual, I had the whole plant cut up and cured in the Pennsylvania style. I am so much pleased at the result, that I am inclined to think, I shall not waste a month in every year, as heretofore, in gathering and securing fodder. To enable those who may be willing to try the experiment, I would recommend them to put their meadow lands in herds grass, by way of getting ready. Each hand is supplied with a long knife or blade, (a piece of scythe blade answers well) having a convenient handle, with which he cuts the stalk about eighteen inches or two feet from the ground; thus leaving the heaviest part of the stalk to be chopped down immediately after, and turned in during the seeding of the grain. As soon as the latter operation is over, the corn is husked in the field, and taken to the crib, which should be divided into two or more apartments, after the manner of your corn-pen, as described at page 50,

*See page 567, Vol. I. Farmers' Register.

of Vol. I. So soon as this is over, the stalks are stacked as our tops are usually, and afford fine food for horses and cattle of every description.

I have lately learned from a gentleman of great experience, that one hundred pounds per day is a fair average for a hand's work in pulling fodder. Can this sacrifice of labor be much longer borne on an empoverished soil? I shall hope not.

C. H. MINGE.

[The foregoing letter contains the writer's second year's experience of the cost of transporting marl by water, and may be considered a continuation of a former communication on the same subject, which was published in Vol. I. at page 567, to which the reader is referred for the full grounds of the estimate of expense. According to that estimate, the carting of these 17,000 bushels of marl from the landing to the field, (1000 yards) and spreading would amount to $110 28—to which add the cost above stated for digging and water carriage $270 50, and it appears that the total cost was $380 78, or not quite 2¼ cents the bushel. These facts well deserve the attention of all land-holders on navigable water, who have not marl on their own farms.]

SOME ACCOUNT OF THE CALCAREOUS REGION OF ALABAMA.

To the Editor of the Farmers' Register.

Greene County, (Ala.,) Jan. 27th, 1835.

* * * I have had it in contemplation for some time to send you some of the different varieties of prairie soil for analysis: I will do so, if agreeable to your wishes. It is no doubt composed almost entirely of marl, and is a soil *sui generis*. It is formed apparently by the decomposition of marine shells—but the fossil remains of some antediluvian animals of immense size are also found in it. There are some fossil remains in Clarke county of an animal whose vertebræ are said to be as large as a dinner plate, and have been used by the inhabitants as fire-dogs. Almost the whole skeleton, I was informed lately, was still lying on the surface of the earth where the animal perished; but I have been unable as yet to procure any specimens of it. The prairie soil is invariably based on rotten lime-stone rock, which is seldom more than ten feet under the surface, and sometimes is not as many inches. It has been perforated to the depth of seven hundred feet for water, and sometimes without success even at that depth; but it is invariably mixed with shells. It has a regular dip from Erie to the neighborhood of Linden in Marengo, of about twenty-five feet to the mile. Where the rock is perforated, the water frequently runs out above the surface of the earth, and sometimes continues to do so, even as high as twenty feet. The water is not generally pleasant to those unaccustomed to its use, and sometimes is highly impregnated with sulphur. Small balls of the sulphuret of iron are frequently found near the surface and among the rock. Entire strata of shells sometimes alternate with the rock, as may be seen in the rock bluffs on the rivers. Near the surface the rock is entirely free from grit; but the lowest stratum is a very hard sand-stone which the borers have to drill, as an auger will make no impression upon it. When dug up and exposed to the atmosphere the lime-stone readily decomposes and forms a good soil. If kept, however, for some time under a shelter, it becomes hard, and blocks sawed out when it is soft, are sometimes used to build houses and chimneys. It is unfit for the kiln, and will not burn to lime, except a variety which lies in detached pieces on the surface, and is perforated with many small holes.

The soil of the prairies improves by cultivation, and a small quantity of manure increases the product astonishingly, the effects remaining visible for a long time afterwards. It is not very well adapted to the cultivation of cotton without some vegetable manure, except where it is timbered, as the lime causes the plant to rust, and shed its leaves and bolls before they come to maturity. Any grain will grow well on the open prairie; but it seems peculiarly adapted to the growth of Indian corn, oats, and barley. When wet, the soil is as soft and muddy as a bed of mortar, and the roads become, in many places, entirely impassable. When dry, they are very hard, but never dusty. As might be presumed from the nature of the soil, it requires very little rain to perfect the crops on it. If broken early and deep, Indian corn will mature *without any*, and *never twists, (from drought,)* even when it has no rain on it from the time of coming up. Rains however, increase the crops very much, as well as on other lands.

The prairie soils are remarkable for health, the lime seeming to correct all noxious effluvia from animal and vegetable remains. The inhabitants enjoy a singular exemption from intermittent and bilious fevers, even when the people on the surrounding sandy soils, particularly on the rivers, suffer severely. The summer and fall months are much the healthiest. There are no springs, properly so called, in the prairies, and the water-courses, (which are fed by seeps,) dry up in the fall: hence the necessity of boring.

The limit of my paper prevents my saying more, and indeed, I only intended making two or three observations when I commenced. If you wish, however, I will send you some of the different varieties of soil, if you will give us the analysis. We might perhaps, better understand the *modus operandi*.

ROBERT W. WITHERS.

[The specimens of the prairie soils, offered by our correspondent will be very acceptable, as will any other specimens from dry prairies remarkable for fertility, or the reverse, in all the western and south-western states. A request for this has already been made in this work, (page 455, No. 7,) and it is sufficient here to refer to the directions there given for selecting and transmitting the specimens. Particular and exact descriptions should accompany them, or the specimens will be of little value or interest.]

LARGE PRODUCTS OF CORN.

[The letter of Mr. Coleman, which is referred to below, has already been inserted at length in the Farmers' Register—at page 359, vol. I.]

To the Editor of the Farmers' Register.

We agriculturists are, in general, the greatest gulls imaginable in regard to all spick-and-span new things—matters of which we have never

heard before, and upon which, therefore, we can have no pretence to exercise our own ineffable self-conceit. At the same time, we often show ourselves to be the veriest infidels upon earth as to every new thing affirmed of what we believe that we understand very well, merely from having been long accustomed to it. Our own comparatively limited experience is made the standard of all that is knowable or attainable, in relation to such matters. Thus the owners and cultivators of poor land, as most Virginia farmers are, will generally be found—not only ignorant of what actually *can be* produced by soils, either naturally or artificially very fertile, but they are utterly incredulous when they hear of any crop which they themselves have been used to cultivate, being elsewhere made to a far greater amount per acre, than they have ever made, or seen others make.

Of these general truths, I lately witnessed a most striking exemplification. Happening to be in a large company, and the conversation turning upon agricultural subjects, I ventured to state, upon such authority as I thought would not be questioned—authority, in fact, that any court of law would have deemed sufficient, that a certain number of barrels of corn, far exceeding the average quantity, had been made on a single acre of land, on the South Branch of the Potomac. The derisive stare of incredulity was plainly legible upon several countenances—not that any seemed to doubt my having heard what I stated, but these skeptical gentlemen evidently disbelieved the fact itself. Indeed, one of the company commenced a calculation, but soon stopped short, to prove that the quantity of corn said to have been produced by the acre, would have more than covered the whole surface, if the ears had been spread on it as close as they could be placed side by side. Now, not a shadow of doubt could have been either felt or expressed by an individual of the company, (who were, most of them, farmers or planters,) had they given themselves the trouble to read the various accounts which have been published from time to time, in all our agricultural papers throughout the country, and authenticated as satisfactorily as any judicial record, that still larger quantities of corn have been made per acre, than the quantity mentioned by me, which seemed to excite such unexpected incredulity.

With a view to show that I have the requisite proofs to confirm my assertion, let me beg you to re-publish from the 15th volume of the American Farmer the following accounts of extraordinary crops of corn made in different parts of the United States, in regard to which, all the facts seem to be just as well authenticated as that *you* publish the Farmers' Register. Besides curing, I hope, the skepticism of the gentlemen to whom I allude —who will probably see this statement, it may serve the still more valuable purpose of stimulating others to exert themselves in improving their corn-lands far beyond any degree of fertility which they have heretofore believed them capable of attaining.

In the 15th volume of the American Farmer, page 243, you will find the following facts copied from the New York Farmer, to the editor of which they were communicated by a Mr. Henry Coleman of Massachusetts. He says, "they were submitted to the most careful examination, and established by the fullest proof."

"John Stevens, of Hoboken, N. J. produced on one acre 118 bushels, 2 quarts. Mr. S. was confident he would have had considerably more corn, had not his crop suffered very greatly by a thunder-storm, which laid the greater part of it down at the time the ears were setting. On this crop a bet of 50 guineas was pending. The motives to exact measurement were such, therefore, as to secure accuracy. This was some years since: the particular date I am not able to ascertain."

"Dr. Steele, of Saratoga, in giving an attested account of the crops of Earl Stimson, in 1821, says, that he had eight acres of Indian corn, which yielded 112 bushels to the acre—896 bushels; ten do. do. 90 bushels to the acre—900 bushels.—(Memoirs of the New York Agricultural Society, vol. II. page 73.")

"The following individuals applied to the Agricultural Society in Washington county, Pennsylvania, in October 1823, for premiums, with authenticated evidence of the quantity raised per acre on not less than five acres: Joseph Evans, 136 bushels; John Wolf, 127½ do. do.; Samuel Anderson, 123 bushels, 12 quarts do.; Isaac Vanvokers, 120 do. do.; Isaac Buckingham, 118 bushels, 1 quart do.; James Clakey, 113 do. do.; Jesse Cooper, 108 do. do.; De Gross Jennings, 120 do. do."

"In the same year, the following individuals applied to the Alleghany county Agricultural Society, for premiums on their crops: James Anderson, of Ross township, 103 bushels, 17 quarts on 1 acre; John Snyder of do. 103 do. per acre on five acres; John Irwin, of do. 105 bushels, 20 quarts per acre on four and three-quarter acres; William McClure, 129 bushels per acre on five acres. —(Memoirs of Pennsylvania Agricultural Society, vol. vi. page 228.")

"In 1822, J. & M. Pratt, of Easton, Madison county, New York, obtained from one acre, 172¼ bushels do. do. 161 do.—do. do. 161 do. In 1821 the same gentlemen obtained from four acres 680 bushels, or 170 to the acre." Their crops were subjected to the particular examination of committees for a premium: and they say they have no doubt of being able to raise 200 bushels per acre."

"In 1823, Benjamin Bartlett, of Easton, Madison county, N. Y., obtained from one acre, 174 bushels. The veracity of this gentleman is equally unquestioned, and his too, was a premium crop."

"In 1831, Benjamin Butler, of Oxford, Chenango county, N. Y., states that he raised 130 bushels at 60 lbs. to the bushel, or 140 bushels at 56 lb. per bushel.—(New England Farmer for Nov. 1831.)

Fifteen other cases, all substantiated by evidence perfectly satisfactory, are stated by Mr. Coleman, of corn crops made in the cold, uncongenial climate of Massachusetts, from the year 1820 to 1831, where the produce per acre varied from 110 bushels—the lowest, to 142 bushels—the highest quantity made. But if any of your readers should wish to see Mr. Coleman's own statement, let him turn to the volume and page of the American Farmer to which I have referred.

Now, I beg leave, to inquire—nay, *to demand* of our self-satisfied, opinionated Virginia farmers, why *they* cannot go and do likewise? Why *they* cannot, at least *equal* the crops of our eastern ag-

ricultural brethren, who are so justly celebrated for their industry and enterprise? *They* have to contend against the natural obstacles of a bad soil and climate, unpropitious to the corn crop, which is best adapted to a more southern latitude. *We*, on the other hand, are blessed, both with a soil and climate admirably suited to its growth and productiveness. , Shall *we* then, neglect—nay, *despise* these incalculable advantages? Shall we not rather bend both body and mind to avail ourselves of them to their fullest extent? Shall we always content ourselves to be at the laboring oar —to be common and inferior sailors, when we might justly aspire to command the ship? Oh! forbid it every feeling of allowable state-pride—every just estimate of the rank we southern agriculturists are entitled to hold, in our body politic.

Pardon, my good sir, this slight exhibition of professional and state-partiality. Most persons will probably say, that the occasion did not justify it; that it is a hop, skip, and jump, kind of business. But there is no tracing the concentration of ideas in such desultory thinkers as myself: for I may address you at Shellbanks, and land you—if you please to follow me—on the summit of Chimboraço. Should your readers therefore, not be able to go along with me so far, as to attribute what I have written to an adequate cause, I shall reconcile myself as well as I can, to their condemnation of your friend and constant reader.

J. M. G.

From the Genesee Farmer.

THE HORSE RAKE.

"The horse hay-rake was invented by a colored man who lived on Hempstead Plain, on Long Island. He died about the year 1821. It was introduced into Pennsylvania by Michael Newbold, of Oxford, Philadelphia county, about the year 1812, in consequence of the representations of a Yankee pedlar, who instructed him how to make one. His first rake was destroyed by a malicious person who feared its innovating effects on the price of labor. The original rake is preferable to the patented one, except on smooth level ground. With us the horse rake is an indispensable implement, and has lessened the expense of hay-making one-third, and perhaps in some cases one-half."

Who can give us the name and history of the original inventor of the horse rake? Whether he was black or white, bond or free, he ought to be known as a public benefactor.

For the Farmers' Register.

MONTHLY COMMERCIAL REPORT.

Another month of comparative inactivity in the trade of Virginia has elapsed, taking previous years as a criterion. The navigation of our rivers has been a second time closed by ice, and even that of Chesapeake Bay was obstructed.

Tobacco is the only article of which the usual supply has been brought to market—but this is not the season of the year for large receipts. The price has undergone little change: if any, it is in favor of the planter.

The price of cotton has fluctuated a little. It advanced to 15 to 15¾, and has declined to 14½ to 15¼ cents. The operations have been to a small extent, owing to the moderate supply, and to the holders requiring higher prices than can be realized in foreign markets. The receipts in the southern and western ports continue to exceed those of last season to a great extent.

One heavy operation in city mills flour is reported, say 15,000 bbls. The market has not been brisk. City mills $5½ to $5¾—country brand $4½ to $4¾.

The annual returns of the import and consumption of American products in Europe, furnish, among other, the following statements.

Import and consumption of cotton in Great Britain.

	IMPORT.		CONSUMPTION.		
	U. States.	All sorts.	U. States.	All sorts.	
1830	618,750	871,950	539,050	805,500	bales
1831	608,750	905,200	618,600	881,500	"
1832	628,850	901,700	630,250	877,800	"
1833	657,750	933,100	655,750	899,100	"
1834	731,350	948,500	695,600	904,500	"

Consumption of cotton in France.

1830		250,800	"
1831		243,900	"
1832		272,500	"
1833	200,400	276,400	"
1834	234,200	301,600	"

Exhibiting an increase in both countries, and this increase is enhanced by the greater number of bales from the United States consumed each successive year, the weight of such being heavier than those from other countries. Thus, if the bales are estimated to average 300 lbs. each, the consumption in Great Britain would appear thus:

In 1830	721,000	bales of	300 lbs.
1831	781,000	"	"
1832	859,000	"	"
1833	890,000	"	"
1834	972,000	"	"

The stocks of tobacco remaining on hand in Great Britain and Ireland at the close of each year, are reported as follows:

1829	36,500	hhds.	1832	28,600	hhds.
1830	33,000	"	1833	25,500	"
1831	33,000	"	1834	26,400	"

The quantity taken for consumption in each year varies so little as not to be worth notice, but it scarcely exceeds one-half of the smaller quantity above reported, and the remainder is re-exported from England to other countries.

What effect will be produced on commerce by the recent cessation of diplomatic intercourse between this country and France, remains to be ascertained—but the immediate one is some decline in the price of cotton—probably of public stocks and of ships.

It is decided that no addition will this year be made to the banking capital of Virginia.

x.

Feb. 24, 1835.

ON RAISING CEDARS FROM THE SEED, AND TRANSPLANTING THEM FOR HEDGES.

[We annex below the extract referred to by our correspondent, and thank him for pointing out what we had forgotten, and still more for adding thereto his own experience on the subject.]

To the Editor of the Farmers' Register.

Fayetteville N. C., Feb. 16th, 1835.

Mr. S. Hobson (whose inquiries were made in your No. 9) will find in page 22 Vol. III. of the American Farmer, the mode of raising cedar hedges from the seed. I have followed the directions given there with the most satisfactory results. More than half the cedar berries prepared and planted agreeably to those instructions vegetated and flourished well.

I have not lost more than one tree in 50 by transplanting, unless the tops were cut off. In that case the trees die or decline so as to be of little account: they will improve by severe trimming if the top is left perfect.

I prefer a wet season in March or April for transplanting ever-greens, but have succeeded by taking proper pains at all seasons, except the extremes of heat and cold.

B. R.

From the American Farmer.

Gather the berries in November or December. Rub off the skin and wash the kernels—rubbing them well between the hands, so as to get off as much of the resinous substance as possible, then mix them with unslacked ashes, and let them remain in the ashes for a fortnight; then plant them in drills as you would peas, and they will vegetate and come up the following spring; and being well nursed, they will in two years be fit to plant out in hedges—about the first of March is the proper time for planting them—throw into the bottom of the trench, light rich earth, such as may be had from the surface of productive ground. When the trees attain three feet high, you should begin to train the hedge—about the middle of summer, is a suitable time for this operation, and it ought to be carefully continued until the hedge is as high as you may desire it—about seven feet high, and three and a half feet broad is sufficient.

N. B. The better you cleanse the kernel, the more certainly the seed will vegetate—by proper care an excellent hedge may be expected in seven years which for beauty and durability, cannot be surpassed either by thorns or any other growth.

From the Genesee Farmer.

SOUR SOILS.

Mr. Tucker—Are not Mr. Ruffin's ideas about sour soil* more fanciful than true? I believe that we may analyze our soils as strictly as we please, and find nothing in them assimilating to oxalic acid. That this acid exists in sorrel, and many other vegetables, I conceive is no proof that it exists in the earth. Remove the sorrel and other vegetables, and then analyze the soil in which they grew, and if any oxalic acid is found, then we may conclude that it exists in the soil; but if not, I think we should conclude that it is derived from the atmosphere like most other peculiarities found in vegetables—such as potash, sugar, lime, gypsum, aroma, tannin, &c.

It appears to me that plants derive these by the peculiar formation of their pores, in the same way that a crab apple stock is made to produce the sweet pippin by grafting, but I may be mistaken and really wish for information.

DUBIO.

[The author of the work referred to above is both willing and anxious to have the doctrine of the acidity of soils, as well as any other of his novel or doubtful positions, submitted to the test of the most rigorous scrutiny—and is ready to defend them, if necessary, or to yield to and abide by any just condemnation pronounced by those more enlightened by science, or by experimental knowledge. But it is unnecessary to reply to the doubts or objections of a writer on the properties of soils, who sets out with assuming that the *lime* and *gypsum* "found in vegetables" "are derived from the atmosphere."]

* Gen. Far., vol. 4, p. 385 and Farmers' Register p. 633, both quoting from the Essay on Calcareous Manures.

REMARKS ON PUTRESCENT MANURES, AND THE OPINIONS OF J. B. ON THAT SUBJECT.

To the Editor of the Farmers' Register.

February 14th, 1835.

Dear Sir—In the January No. of your excellent journal, [page 497] there is a long communication signed J. B., with which, upon the whole, I have been very much gratified—not only because it is upon a subject highly interesting to all owners of soils which require manures—as most of our Virginia lands do most sadly—but because the writer has, in my humble opinion, treated it remarkably well. Still, as all men will differ, and as he himself has invited the utmost freedom of discussion in regard to every opinion which he has advanced, as well as to the arguments urged in support of it, I will venture, in my desultory way, to offer some remarks on particular parts of his communication.

To prevent any misconstruction of my motives, on account of the character of my comments, I will merely add, that I do not believe the public attention, in these times, can possibly be attracted generally, to *any discussion whatever*—no matter how important the subject may be, unless the parties engaged can prevail upon themselves to spice it as highly as they can. The public taste is deplorably vitiated in this respect—and consequently, must be indulged to a certain extent—even where the sole view is, to correct it: just as a doctor envelopes his curative physic—or what he hopes will prove so, in something *not medicinal*, merely because it will not otherwise be swallowed. With this key to all I mean to say, your correspondent, I hope, cannot mistake my feelings towards him, or my motives for expressing myself as I may do—being perfectly willing that he, or any other correspondent of yours, should make equally free with every opinion or argument I may utter.

The first of his assertions from which I must dissent, is that which he has italicised, and thrown into the form of an antithetical axiom. Since he seems to design it as a kind of corner-stone to

much of his superstructure, it merits particular examination. "*Facts,*" (says he,) "*the causes of which are not understood, are not truths, and serve only to mislead us.*" In this sentence, short as it is, there are two unqualified assertions, totally inadmissible as they here stand. Throw them into the form of a syllogism—which is the way to test them—and where would they land us? Not, perhaps, "in the slough of despond," but "in confusion worse confounded." Let us try two of these syllogisms to prove how far I am right.

"*Facts, the causes of which are not understood, are not truths.*"

But most of the facts stated by J. B. himself proceed from causes, not understood.

Ergo—most of J. B's. facts "*are not truths*"

Again. "*Facts the causes of which are not understood, are not truths.*"

But the causes of the fact that we exist, are not understood. Ergo, it is not a truth, that we exist!!

I could go on, sir, to fill your Register with similar syllogistic arguments, wherein the conclusions would all be undeniable from J. B's premises; but the two just stated suffice to show that his axiom is a contradiction in terms. Nay, admit it to be correct, and it would reduce the sum and substance of all human knowledge nearly within the compass of a nut-shell. It would do still worse; for according to him, all the facts in the world, "*the causes of which are not understood, serve only to mislead us.*" To prove this assertion equally untenable, I will ask but three short questions. Is the negro who mauls our rails after long practice, misled by not understanding the cause of the fact that the wedge acts as it does? Is the carpenter mislead in boring an auger-hole, or turning a heavy piece of timber with a handspike, if ignorant of the cause of the fact, that the screw and the borer work as they do, in those operations? Or is the ploughman misled by the fact that his plough cuts, and its mould-board turns the furrow-slice, because he understands not the cause of either effect? God help us, if they were, or their masters either, who are often nearly as ignorant of all these matters as themselves.

The worst that can justly be said of facts—the causes of which are not understood, is, that such facts *may* mislead us; but why, considering man's natural desire for knowledge, they should oftener lead him wrong than right; or should always so far *mislead*, as to deprive them of all right to be called *truths* as well as facts, I must believe would puzzle all the logicians in the world to prove. Certain it is—at least to my mind, that J. B. has utterly failed to sustain so strange a paradox—nay, so palpable a contradiction, by any thing bearing the semblance of proof.

The next of J. B's. assertions to which I object as deficient in proof, is the one wherein he is endeavoring to show an analogy between the earth and the human stomach, for the purpose of demonstrating that as the latter requires cooked food for the nutriment of the body, so the former requires *cooked manure*, (if I may so express myself,) for the nutriment of the plants which grow on it. His words are—

"Raw meat and vegetables contain more nutritive matter for the human stomach, than after the loss necessarily sustained by their being cooked: yet the remainder, after this process, is fitted for the sustenance of man, and *therefore is more valuable than the whole was before the change, and the waste caused by cooking.*" Now, not to say one word of the vast difference between nature's and man's cookery, so forcibly illustrated by the old adage—"God sends food, but the devil sends cooks;" nor of the fact, that nature alone is capable of cooking food for plants, there are, I think, numerous facts to prove that the above assertion of J. B. is altogether untenable. Not to insist upon the undisputed case of Nebuchadnezzar, (I mean no irreverence, Mr. Editor,) who lived seven years upon raw vegetables, and reigned a considerable time afier as a great king, I will confidently ask, if any people among ourselves, generally appear better "*fatted,*" (as we say of our cattle and hogs,) than that numerous class styled gourmands and epicures, who eat all their meats in a state so nearly raw, that the little warming imparted is really not worth mentioning. Again, all men eat a large portion of their vegetables raw. Such is the state of salads of every kind, cucumbers, onions, celery, &c. when taken into the stomach. Nay, that vile article called cold-slaugh, so great a favorite with thousands of our citizens, and which, in plain English, is nothing more than raw cabbage with a few condiments added, has been ascertained by Dr. Beaumont, to be by far the most digestible of all the varieties of food with which trials were made, in his very remarkble experiments, at the City of Washington two years ago, upon the stomach of a man who had a hole in his side, through which, the food was introduced.

The last of J. B's. assertions against which I beg leave to enter my dissent, is that wherein he speaks of the coarse manure of our farm-pens, composed, in great part, of corn-stalks. Of this he says, among other assertions, that, "every corn-stalk serves as a flue or chimney, to carry off the gases which are evolved." Now, unless there are such things as flues and chimneys stopped at both ends, which can still carry off such subtle vapors as gases, or corn-stalks without joints, of which I have never yet heard, this last assumption is equally untenable with the others which I have taken the liberty to examine. Even admitting that every corn-stalk was a firm, hollow tube from end to end, before it could act as "a flue or chimney," one end at least must be higher than the other, and the lower one not stopped up with earth, (as it must be, if below the surface,) but *open*, and sufficiently near the ground for the atmosphere to force into it whatever is expected to pass upwards through it. True it is, that corn-stalks, in process of time, become hollow at the joints, as well as between them; but not until every thing in the form of gas has very nearly or quite made its escape.

Having done with with what appears to be the faults of J. B's. communication, I proceed to the more agreeable task of commenting on its merits. Of these, I think, I may venture to assert, that you have had no correspondent since your Register commenced, who has manifested a more thorough acquaintance with the opinions of all the best writers on the subject which he has undertaken to discuss; nor any who have selected topics of greater interest to agriculturists, or better suited to the chief objects of your paper. He has given us scientific theory and practice combined, as they

always should be; and if one who has no great stock of either, may venture to offer his mite of contribution towards the attainment of your well informed correspondent's purpose, I will now present it in the most intelligible way I can.

Throughout J. B's. communication the predominant opinion seems to be, that the best general practice in regard to the preparation and application of manures, is, that they should be used in the freshest state compatible with whatever degree of fermentation may be necessary to fit them best for food to plants. This seems to be the present opinion of a vast majority of the best informed agriculturists—both in Europe and America; and it appears to be as clearly proved as any thing of the kind can be—provided we take it for granted, that previous fermentation, by man's management, really *is* indispenable. But the great "*nodus vindice dignus*,"—the grand difficulty to be overcome is, to ascertain what should be the precise degree of this supposed essential fermentation. Nearly the whole puzzle, in my humble judgement, arises from all parties having assumed it as true, that from the incipient to the final stage of fermentation in manures, both the evaporable and evaporating substances, not only all constitute the food of plants—which has never been proved; but that all have a greater tendency to unite with the atmosphere, than with the earth, which is also an opinion without any thing like satisfactory proof. Now there *is* an hypothesis, which I will father, if no one else has a previous claim,—an hypothesis strongly corroborated, I think, by J. B. himself, (as I will hereafter show,) which, if true, will go farther towards putting this much vexed question to rest, than any other that I have ever noticed.

The earth has truly been called the matrix or common mother of all plants, except the very few that 'tis said, will grow in the air suspended by a thread. Of the natural food for her offspring, she herself possesses, as all admit, a very large quantity; but not having enough, where too many and unreasonable exactions have been levied upon her by the reckless cupidity of man, an all bountiful Providence has given her the power—a kind of chemical affinity or elective attraction, (as I beg leave to call it,) of drawing to herself and uniting with all extraneous substances, in contact with her surface, which are susceptible of conversion into the food of plants. This conversion begins the moment these substances touch the earth, if there is any moisture in them, and continues, until the rains dissolve every thing in them, capable of solution. Admit this, and does it not follow, as a necessary consequence, that the earth, which is the natural mother of a vast majority of all the plants known to man, must have a much stronger elective attraction for every kind of food essential to the healthful nourishment of her children—food which she herself has to administer below her surface, than the atmosphere can possibly have, which is not their natural parent, and has nothing to do with their nurture, until they appear above ground? *If she has*, then will the conclusion be irresistible, that all the gaseous substances which are supposed to be component parts of the food of plants, will first impart, while in solution, to the earth herself, such portion of that food, as she alone can prepare and administer, rather than wait to be carried off with some sort of gas to the atmosphere, where it cannot be used, simply because the means and appliances used by the latter, for the nurture of plants, are materially different from those used by the former, each having distinct functions to discharge for the accomplishment of the same great end, which is the perfection of every plant that grows. Again, having these distinct functions to discharge, which none I believe deny, even supposing the earth and the atmosphere to be sentient and moral beings, is it rational to conjecture, that either would, if it were possible, deprive the other of any means to promote a common object, which that other alone could apply? Would the earth keep gas, (which, by the way, is as great a physical impossibility as to prevent water from seeking its level,) when she could not apply it to the nurture of her children—*that* application being the natural province of the atmosphere? Or would the atmosphere take from her sister—were such robbery in her power, any nutritive substance which she herself was incapable of applying? A negative answer, I think, would be given to both these questions by every man whose sole object was *truth*.

The only thing assumed in the foregoing hypothesis is, that the earth and the atmosphere having to nourish plants in a different manner, and by different means—one being the nurse below, and the other above ground, neither can possibly take from the other, *any thing* which itself cannot use for their joint object. Of course, nothing *will be taken;* and of course, there can be no danger in spreading manure on the surface of the earth as soon as it may be convenient to do so. In support of this theory, I will now adduce, among other proofs, the premised fact from J. B himself. 'Tis true that he gives it in the form of a simple assertion; but all, I think, will admit it to be both a fact and a truth, although not according to his logic.

In commenting upon what he calls "the causes of waste" in the making and applying manures, he says:—"Fortunately however, for the fertility of the earth, bountiful nature offers to the soil much more than it is deprived of by fermentation: and however great may be the losses sustained, *still the gains are greater*." Although he has not specified how these gains accrue, it must be obvious to all, that it cannot be, in any other way, since the mode is a *natural*, not an *artificial* one, than by the frequent deposite, on the suface of the earth, of all the deciduous parts of trees and smaller plants. In this mode, you see, nature applies all *her* restoratives *to the surface*, there to be dissolved by the rains, and absorbed by the earth, which retains *her* proper portion, while the exhaling gases impart to the atmosphere *her* congenial part, thence to be returned to the plants through the absorbent vessels of their leaves and other parts. To talk of the latter committing upon the former, either grand or petty larceny, in stealing her property, or to speak of nature as *losing* or *wasting* any thing, seems to me, a slander upon her character. God leaves *that folly* to be committed—only by his creature *man*, during the various trials to which he is subjected for his own good.

In the last quotation from J. B. we find the opinion very distinctly expressed, that nature herself, in process of time, restores to soils, in some way or other, more than they are generally believed to lose by fermentation. But I beg leave to inquire,

why suppose any loss at all from this cause? If the natural means of restoration, only alluded to by J. B. be, (as I suppose,) the rotting upon the earth's surface all the deciduous parts of trees and smaller plants, what is the *modus operandi*, as far as we understand it, of effecting this restoration? As it is *nature's* method, we must believe it *the best*; and where is the necessity of supposing it any thing *lost* in the process, since it is quite irrational, as well as unscientific, to imagine *her* capable of wasting any of her precious gifts to man? Would it not be much more consistent, both with science and reason, to suppose, that such parts of her deposites as are designed to restore to the earth her diminished power of nourishing plants—a power which the folly and ingratitude of man alone may have impaired or destroyed, are converted to that use without any loss or waste whatever, than to imagine that the atmosphere stole a part of these deposites—a part too, which the atmosphere could not apply? Would it not be a much easier solution of the seeming mystery, to believe, that the earth and the atmosphere, by their own peculiar elective attractions will and must divide between them, all the food of plants contained in manure, whether such manures be above or below ground; and that therefore, interposition by man can only injuriously retard, but cannot prevent it? Nay, that he cannot, by any imaginable contrivance, cause the one to encroach upon the functions of the other, since nature has proclaimed to each—"*thus far shalt thou go, but no farther.*"

In nature's method of restoring exhausted fertility, there is no heaping and piling, and turning, and hastening or retarding fermentation; but when the rains, and the dews, and the heat come from the heavens, the process of converting the deciduous parts of trees and smaller plants into proper food for themselves and their successors, commences and goes on with more or less natural rapidity, until it is finished—the earth doing *her* duty, and the atmosphere *her's*, without the possibility of any interference whatever. Such an unnatural conflict can have no existence but in the vagaries and vain imaginings of man himself. Now, if the admirable rule, "follow nature," is to be any guide for us in improving our lands by manure, how is this to be done? Is it by applying them to the surface, or burying them below it? The answer to these questions, if candidly given, would end the controversy forever. But it will be said perhaps, by some who loathe the trouble of studying any subject thoroughly, "this is all *theory!* what says *practice?*" Let us try then, whether their great oracle, *practice*, (great, I admit it to be, when truly scientific,) affords no testimony conclusively favorable to the opinion which I have ventured to advance. I myself can testify to four different experiments, made with great accuracy, upon cow-pens, alternately ploughed up on removal, and left unploughed, having been made and continued from the earliest period in the spring, at which cattle are penned, to the latest time in the fall. The pens were regularly removed once a fortnight—the size of each pen was exactly the same, as was also the average number of cattle, during each fortnight, without any variation worth noticing. In every case, without a solitary exception, a purblind man might have seen the difference, most distinctly marked, in favor, not only of the corn crop, but of the wheat crop also, which immediately followed. The rationale of these facts I have already attempted to explain; and if such explanation be deemed satisfactory, your correspondent J. B. I hope, will admit them to be *truths also*. Experiments precisely similar, and with the same results, have been stated to me by not less than ten or fifteen gentlemen of unquestionable veracity—so that I, at least, no longer entertain a shadow of doubt, as to the best management of the manure from spring, summer, and fall cow-pens. If ploughed in, the soluble parts very soon unite with the subjacent stratum of earth, at a depth too great for such fibrous rooted plants as form the chief of our staple crops, to derive much, if any benefit from them; while such portions as have a stronger chemical affinity to the atmosphere, inevitably find their way to it, although somewhat more slowly perhaps, than if left on the surface. To suppose it possible for gaseous substances to be confined below the surface of the earth, at any depth to which manure is ever buried—unless indeed, they were hermetically sealed up in vessels of glass, stone, or metal, seems to me a supposition that would never enter into any man's head who had the least knowledge even of the simplest principles of chemistry. But unless such confinement were practicable, merely by the ploughing in of manure, then the above objection to this process appears to me sufficient to prevent its adoption. When manure is spread on the surface, as nature spreads all her fertilizing substances, the parts of it which naturally have a greater tendency to unite with the earth than with the atmosphere, will all certainly do so immediately after the rains and dews dissolve them; and that too, to the average depth best suited to a great majority of the plants to be nourished by them.

But the great doubt, the grand difficulty with us slovenly Virginia farmers, is said to be, how to manage that principal dependance for improving those exhausted lands which have been nearly murdered by our barbarity and ignorance. I mean the coarse farm-pen manure of which corn-stalks constitute, at least a most conspicuous, if not a very useful part: *corn-stalks!* those treacherous little rogues that contrive to steal away our farm-pen gases, in a manner heretofore so unsuspected, and hitherto so inexplicable.

If hearsay testimony were admissible, I could adduce much in which I myself entirely confide, to prove that surface-application is best, even for coarse farm-pen manure. But unfortunately, I have personal knowledge of only *one case*, which having happened on my own farm, where all the circumstances occurred under my own eye, I will venture to state. In regard to the result, there could not possibly be any mistake; neither was there any in the facts which I shall detail. If my hypothesis be deemed insufficient to explain the whole, both as to cause and effect, I invite J. B. or any other of your numerous contributors to try his hand at expounding.

The case to which I allude, was the following. Some years ago, I had spread and ploughed under, (according to Col. Taylor's plan,) as much of my farm-pen manure as I supposed would suffice for that part of corn land—previously ploughed up in beds to be reversed, which I had allotted to receive it. The pens, however, produced more than

I expected. This I had spread on the adjoining corn-ground, which had been planted, but was not up. There it remained for some weeks, until the corn received its first working, and then was not buried as deep as the other manure ploughed under before the corn was there planted. The quantity of the surface-spread-manure per acre, was as nearly equal as the eye could make it, to that which had been ploughed under—for I had no idea at the time, of making an experiment to favor a preconceived opinion, and of course, did not attempt, as most men are too apt to do under similar circumstances, so to manage the trial as to suit that opinion. Indeed, my belief, (adopted merely from faith in others,) then was, that it was best to turn in all kinds of manure. The result of this accidental experiment was, that the corn upon the land whereon the manure was applied to the surface, not only maintained the start which its being first up gave it, but manifestly increased that superiority in a ratio considerably exceeding the difference which that circumstance alone could create, and at last produced much more in proportion. The excess was too plain to require accurate measuring to ascertain it; and having no idea at the time of publishing the experiment, the usual measurement by a tub was not made.

Having the same object in view with your intelligent correspondent J. B., which as I understand him, is to elicit discussion in regard to the principal subject of his communication, I submit the foregoing views to be disposed of as you may deem best; and remain

Yours with much esteem,

J. M. G.

MARL AND MARLING—SPECULATIONS UPON WORLD MAKING.

To the Editor of the Farmers' Register.

Airfield, February, 1835.

I feel that I am delinquent, especially to yourself, and through you, I am so to Professor Rogers. You were kind enough, a long time since, to ask me to send to the latter, specimens of the Henrico marl, to be analyzed by him. Circumstances and the badness of the weather, have delayed a compliance with your request. It shall not be postponed much longer. A late trip to the Rappahannock enabled me to obtain a specimen of the marl in King and Queen I had not visited that country for six years. The road crosses the ridges which lie between the Chickahomony and Pamunkey—the Pamunkey and Mattopony—and the latter and Rappahannock—and, like most of the roads in Virginia, passes over the least valuable and interesting parts of the country. From all I could see and learn (by frequent inquiries) many persons in Hanover, King William, King and Queen, Middlesex, and Essex, have commenced, with spirit, the improvement of their lands, by the use of marl, and other manures. To my eye, a decided improvement had been made since I had last been in that section. I saw one field that had often attracted my attention by its extreme poverty, which has been completely resuscitated by two dressings of marl. It produced a heavy crop of corn last year, and is now neatly sown in wheat, that looks better than any other wheat I saw. The soil seems to have been completely changed in appearance. It was once, like the adjoining field, (not yet marled,) miserably poor, and light—abounding in silex, but in a fine form. Now, it has a greasy, chocolate appearance, that, at once, bespeaks its fertility. I was told that its production has convinced the most ignorant skeptics of the fertilizing qualities of calcareous manures. Vegetable matter was, of course, mixed with the marl. When the land is too poor to put forth a sufficient quantity of vegetation for the marl to act upon, the practice is, to haul oak leaves, pine beards, and other scrapings from the woods. I saw sundry fields, of some extent, regularly dotted over with four or five bushel-heaps of the blue marl, so full of shells that, at some distance, they looked like heaps of snow—the rains having washed down the loose blue clay. This marl is like that found in Henrico and Hanover—having the same sorts of shells—but the blue earth is so filled with fine particles of shells that I suppose one-third of it is calcareous matter. From the centre of one of these heaps the portion was taken, intended for Professor Rogers. I was informed that this sort of marl was found in the branches and swamps; but, that, in the hill-sides, a *yellow marl* was found, much richer, and, of course, more valuable from that consideration, as well as from the facility of getting it. I was not able, in a hasty trip, to get a specimen of it.

The whole tide-water country on the north side of James River has been already much benefited by your Essay on Calcareous Manures, and your still more valuable *Farmers' Register.* If there be any truth in the *motto of the Register,* you have abundant cause to feel satisfied, and ought to sleep sound of nights. The *great men* who live upon the malicious wranglings, the frauds and the crimes of mankind, deserve less grateful respect from the community, than those who teach us *the way to live,* and to turn the bounties of heaven to our advantage and comfort.

May we not hope that a new spirit will soon animate our people, and enable them to develope the beauty and advantages of our *mother state*? The wasting tide of emigration can only be checked by such a spirit, aided by legislative assistance. There are none of us who do not need instruction; and the want of schools is forcibly illustrated by the difficulty of employing, in many parts of the state, an overseer, miller or white laborer, who can read and write. It is remarkable that, in those sections where the means of subsistence are most laboriously obtained, and there are less desirable markets for the products of industry, more attention has been paid to common schools, and the difficulty here spoken of, is less felt. Out of as many as fifty applications that have been made to the writer for such employments, not more than half a dozen of the applicants were able to read and write. What, may we not ask, have been the results of the enormous expenditures from the *primary school fund?* Is there not some crying defect in the whole of our school system? Ought not our legislature to try some other plan? Why not copy the successful systems of some of our sister states? How often does it happen, that when a young man is too proud, or too lazy, to work, and too *worthless* to get or retain employment in business, that he sets up as *schoolmaster,* and is entrusted with the important charge of the morals and education of children! What an error!

How destructive of the hopes of the rising generation! I leave this subject to the elucidation of some abler pen. It is one intimately connected with "the improvement of the practice, and support of the interests of agriculture," and claims a full share of the reflection and labor of yourself and able correspondents.

The whole of the country from the James to the Potomac River has been, from an early period, under an exhausting system of cultivation and grazing. But few farms have had the benefit of amelioration, or even of a judicious rotation of crops. And, it would astonish a farmer from Europe to know this, and see the crops which they still yield, with careless and imperfect cultivation! Under all circumstances, the products of the highlands are more surprising than those of the bottoms, which are so often improved by deposites from the former.

The highland of the whole region north of James River, and below the granite ledge of rocks, taken together, would present to one, raised above, and viewing it, in perspective, a great plain gradually inclined to the ocean, unbroken by mountains or hills. Yet, it is cut up, in every form, direction and fashion, by depressed valleys or bottoms—deep, precipitous ravines—and by long and wide and still deeper gashes, through which the rivers and principal streams wind their devious courses into one another, and then mingle with the waters of the noblest bay on earth. A view of this region might present, to the geologist, materials for his profoundest reflections, and sustain or refute theories that have puzzled and divided the thoughts of wise men.

Appearances tell us that the principal rivers and streams, once covered the beautiful and fertile bottoms through which they now glide. Their deeply sunken beds are defended, in many places, by high banks which exhibit various strata of earth and sand of every variety of color. These high banks are, generally, opposite to marshes which gradually rise into level cultivated flats, extending to the foot of the main highland-plain of the country. I have but seldom seen, on the flats of these rivers, that the lands were much lower at the foot of the hills than the level of the high banks near the stream. This I know to be, very generally, the case with the flats on the great western streams. But may we not suppose, that in the length of time, since the clearing of the adjacent lands, these depressions, if they ever existed, have been filled up by washings from the hills? Such will hereafter, no doubt, be the result in the west. But the river hills there, are so light in texture, or contain so much decomposed vegetable and adhesive matter, that it will take as long to make them run off with the rains, as it did with us.

These remarks apply, in a great degree, to the smaller streams. On them we see similar geological and topographical appearances. They are, however, subject to overspread their banks, and sometimes most disastrously, from heavy and continued rains. These inundations sweep off the soil from one place and deposite it in another; but they are gradually decreasing in extent. This is obviously owing to three causes: 1st, the clearing and cultivation of the country—2nd, the sinking of the *beds* of the streams by constant, and often violent attrition—3rd, the diminution in the waters of every stream in eastern Virginia by the disappearance of so many springs, and the increasing aridity of the whole country. The disappearance of springs, the failure of wells, and the drying up of wet spots, both on high and low land, united with the fact, that, if the average quantum of rain be not much diminished, the humidity of the atmosphere is perceptibly less, are facts that have attracted the attention of every observing man who has reached his fiftieth year. The causes of all these changes in our climate, and of some other appearances which I shall presently notice, deserve investigation; and might be usefully explained by men of ripe learning, who can discard the plausible seductions of abstractions and theory, and give common sense and observation a share in their speculations.

Whether or not the deep cuts and depressions we see in this whole region have been caused mainly by the washings of the rains and the constant abrasion of the streams is an interesting question. The moment we enter upon its consideration we are beset by difficulties, and occular proofs that the earth never could have been *formed* with all its present irregularities of surface: for it can hardly be supposed that the Great First Cause created the shells, the bones, the sea mud, and diversified strata we find, and that he then distributed them so capriciously.

Was the land primarily covered with water? This seems to be conveyed by the Mosaic account of the creation—but whether the earth existed as a solid body, or was held in solution, as chemical acids hold the hardest metallic substances, and was then precipitated, or crystallized, is matter of curious speculation.

With many, it is a favorite theory, that the whole earth was, originally, *rocks* of different sorts; and that the clay and soil have been formed by the decomposition of these rocks, and of vegetable matter. This theory, however, seems to be disproved by the fact, that on the second day, the earth was commanded to bring forth grass, fruit, &c. Still, it is obvious, that a decomposing process is constantly going on in many of the rocks on, and near the earth's surface. Whoever doubts this will be convinced by examining the soil on a hill-side that is interspersed with granite or sand stone. The mouldering condition of the edges and surface of these rocks, the coarse rock-sand near the rocks, and its gradual increase of fineness as you get farther off, until it becomes extremely fine and light in texture, and of color characteristic of the rock—are circumstances which carry conviction to the mind at once—and will dispel the vulgar notion that all "stones and rocks grow like potatoes."

Then, according to the Mosaic account, the earth must have been, *primarily*, covered with water, (if not held in solution,) and after a place of retreat had been prepared, its rapid retirement may have fretted off and carried away the softer parts of the ground, in such a manner as to form the cuts and gashes and depressions which we see, and which puzzle our understandings to account for. But, we have proof positive, that this theory is not alone sufficient. Whence come the immense deposites of fossil shells, and marine appearances to be found in the bottoms of the streams and swamps, remote from salt water; in the ravines on the precipitous hill-sides, and by

borings of over one hundred feet below the surface of the highest plains or promontories? Not only great varieties of shells are found, but the teeth and bones of the largest inhabitants of the deep.

Then, the history of the *creation* will not account, to a rational mind, for all the appearances to which I allude. But Moses tells us of the *flood*, which God said he brought "upon the earth to destroy all *flesh* wherein is the *breath* of life, from under Heaven: and every thing that is in the earth shall die." In this account I see no mention made of the *fishes* and other oceanic inhabitants. But rejecting the idea, that God *created* them in the *waters* of good kind, and threw aside, *under* the earth, vast masses of their bones and shells or rather the fragments of his workmanship with which he was not "well pleased"—throwing aside every speculation relative to the *creation*, let us take the history of the flood, and it will help our minds to some conclusion.

After Noah had entered the Ark, accompanied by his chosen stock for repeopling and reanimating the earth with all that had before moved or breathed upon it or in it, "it came to pass, after seven days that the waters of the flood were upon the earth." In the 600th year of Noah's life, the 2nd month, the 17th day—the *same day* were all "the fountains of the *great deep* broken up, and the windows of heaven were opened"—"and the waters prevailed, and were increased greatly upon the earth"—"and the waters prevailed exceedingly upon the earth; and all the *hills* that were under the whole heaven were covered." "Fifteen cubits upwards did the waters prevail and the mountains were covered"—"and the waters prevailed upon the earth *one hundred and fifty days*." "God made *a wind* to pass over the earth, and the waters assuaged." "The fountains also of the deep and the windows of heaven were stopped, and the rain from heaven was restrained." "And the waters returned from off the earth continually, and *after* the end of the 150 days the waters were abated." May we understand this *abatement* to mean, that the waters ceased to lash, and foam, and roll in mountain waves? The word *abated* can here have no other intelligible meaning: for, the Ark only "rested on the *seventh* month on the 17th day of the month, upon the mountains of Ararat." That is precisely *five* months after "the fountains of the great deep were broken up, and the windows of heaven were opened." But after the Ark had sat down on Ararat, "the waters decreased continually, until the *tenth* month: in the tenth month, on the first day of the month, were the *tops* of the mountains seen." Reference to the account will tell the reader *how long* it was before Noah and his charge disembarked from the Ark. And, reasoning from what little we know, may we not suppose that the agitated waters of such a devouring flood, must have changed the appearance and form of all that had been heretofore dry land, except perhaps, the huge primitive mountains? Ararat, resisted the billows. It would seem that the bed of the ocean, the principal residence of the shelled tribe, was scooped and heaved up, and carried by the waves to great distances; even to the tops of the Andes, where marine appearances are to be found, as well as upon the highest mountains of other countries. We hear of no remains upon these extreme heights, of the larger inhabitants of the deep; and, from the account of the deluge, we may well comprehend how lighter matters may have been bufletted to such an elevation, and left there by the retiring waters.

We may call the whole country below the granite ledge of rocks, *secondary* in its formation. Whether it was dry or was covered by water before the flood, is immaterial to this view of the subject. In either case, our eyes tell us, that the surface has been greatly raised; not by convulsive heavings, nor by volcanic eruptions, but by intermitting agitations of the ocean. May we not suppose that during the long continuance of the flood, the ordinary causes for the tides still were unsuspended; that the winds remained the same, and that there were necessarily, a tremendous roaring, rocking and upturning of the billows of an ocean, which the great "*Jealous*" in all his vengeance had raised fifteen cubits above the highest dry land! What then must have been the changes of the position of every thing which these waters could move or rend asunder! The shelled tribe must have been tossed about and deposited in the places we find them, under the influence of the winds, the tides, and the currents, created in part, probably, by the peculiar original formation of the inundated land. We find these shells in the valleys and on the precipitous hill-sides. But on the hill-sides they are like the other strata, above and below them, uniform in their dip, and undulating with the eminence over which they appear to have been spread. Here we see a stratum of red, here of blue, and there of yellow or white clay; sometimes without sand, but generally mixed with it. In the same deep boring or cut, we frequently find occasional layers of every variety of earth; of pure sand, both red and white. And it often happens, that at different depths, strata of flint stones and pebbles, rounded and polished by attrition, are found with the interstices filled either with pure sand or a mixture of sand and clay, either red or white. High mounds and promontories are often met with, composed chiefly of these gravel deposites.

From all these appearances, the mind is irresistibly led to the conclusion, that the ocean once covered, (and for some time) in a state of great agitation, the whole of Virginia, and I may say, of the United States, for some miles at least, above the present head of tide-water. And can an inquiring mind fail to ask, were not these various strata deposited as we see them, at *different* periods? Could there have been more than one general deluge? If there has been no other than that described by Moses, is it not probable, that the tides, winds and tornadoes that must have happened during the prevalence of the water on the earth, may have varied in violence, so as to leave distinct and characteristic deposites? That this was the case, is indicated by the fact that strata of gravel are found, (within ten feet) with one of sand above, and one below them. We know the effects of high tides, freshets, tempests and storms in our day—how they transport lands, and houses, and trees and rocks; but how awfully different was the deluge of an enraged God!

But it is in vain for finite minds to attempt to unravel the mysteries in the skein of created things. We can only reason from analogy. We see the causes which create new, and fill up the old beds of our streams—which gradually carry

away islands; add to old, and form new ones. Some may think they know the cause of the changes in our climate, and the gradual diminution of the waters of our fountains and rivers: but they cannot agree among themselves about it. Why is it that the tide rises at Cumberland, in the Bay of Fundy, to the great height of *seventy-one feet*, and only nine, at Cape Sable—six and a half at Cape Cod, twenty-five at the mouth of Passamaquoddy river, ten at Penobscot, eight at Halifax (Nova Scotia,) five at New York, four and a half at Cape Henry, five at Norfolk, and but one and a half at the mouths of the Mississippi? But enough of this digression.

G.

From the Cultivator.

WINTERING SHEEP.

In December flocks of sheep require a little of our time and attention; if these are bestowed with subsequent ordinary care, sheep will commonly pass through the winter with trifling loss and much to our advantage. For want of attention in the commencement of winter I have seen large flocks nearly lost during its course, which might have been saved with a little previous care. But when it did occur you could not convince their owners that it was their bad management, as they had made up their minds to impute it solely to their *bad luck*. It is always the best policy for the farmer to have his sheep in good condition when they begin the winter, and then they are sure to go well through it. If however they are permitted to enter it poor and light—good provender and a regular supply of it, which is the best that can then be done, although it may save the lives of some, will not carry them prosperously through it. The foundation of our loss of sheep in winter is laid during the season of pasturing, for the experience of every farmer will teach him that only give them enough to eat during the summer, the natural effect will be that they will put on flesh; and a sheep in good condition is easily and safely wintered, whilst it is a most difficult job to carry a poor sheep safe through the winter. It is wrong to permit them to ramble over the fields later than about the first of December, because at that time there is little nutriment in the scanty herbage on which they feed, and the blades of grass had better remain on the stem to protect it during the frosts and winds of winter, and prepare it for an early and vigorous growth in the spring; besides, as the supply to the animal is small, and innutritious, there is great danger that there will be a falling off in its flesh, which it can illy spare, and which to its subsequent existence it is so necessary it should now retain. I have frequently thought that an open December, which is often wished for by the farmer to save his winter supply of hay, is more prejudicial to his sheep, when they ramble over the fields, and to his own interest, than he is generally aware of. It would certainly comport more with real economy, if he were to bring up his sheep by the 10th, or at farthest the 15th of this month, into winter quarters, even if the weather should remain warm and the ground uncovered; for if they lose flesh at this time, they cannot regain it until spring, and the mortality which sometimes costs almost entire flocks is imputable in a measure to this cause.

Sheep in winter should have sheds; the preservation of their health requires this indulgence, and nature prompts to it. Let me ask, if they have the choice, do they remain in the open air in a storm? No, they as instinctively run to their covering as a man does to his house, and if they do not require it quite as much, they appear quite as well for the shelter. For a flock of poor sheep a protection from the weather is all important. Those in good condition do not as much want it, as they have a better coat both of flesh and wool; but for them it is likewise useful, and a good farmer will not omit to give all the requisite shelter. In those countries in Europe which grow large quantities of the finest wool, they find it indispensable to the attainment of their object, that is fine wool, that their sheep are sheltered from storms both summer and winter, and they have made their arrangements accordingly, for they herd them every night and narrowly watch the indications of the weather during the day. They say that rain and snow give a hardness and coarseness to the wool which they can obviate by a sufficiency of shelter. But to our subject: as soon as sheep are brought into the yard for winter, the different kinds of lambs, ewes, and wethers should be carefully separated and kept apart. It is important that those in one yard should be as nearly of a size as practicable; for by being so, there are no strong ones among them, to drive the weaker from their provender. All will then feed alike and do well. The flocks ought likewise to be as small as we can conveniently make them. It is an invariable rule that a small flock does much better than a large one, even if both, according to their number, are fed equally well. If the flocks in each yard can be reduced to between fifty and one hundred, so much the better; and it is a great desideratum to make them as few as fifty if it can in any way be effected. It is also necessary to have a separate yard for old and poor sheep, and if there are any in the flock that do not subsequently do well they should be removed into what is commonly called the hospital. These hospital sheep, by being few in number, having a good warm shed, a sheaf of oats, or a few screenings from under the fanning mill, once a day, will soon begin to improve. I have had my hospital sheep in a better condition with this care by spring than any other flock, and I must say that for the last three seasons, my sheep were in better condition when I turned them out of my yards in the spring, than when I put them there in the beginning of winter. Sheep ought to be rather sparingly than sumptuously fed, three times a day, and out of racks, to prevent them from running over and trampling on the hay. As soon as one is seen in any of the flocks to become thin, it ought to be removed at once into the hospital where it will be better fed. If you neglect to do this it will soon be too late, and you will suffer loss; for a sheep once reduced to a certain point cannot be recovered. It is of service to give them a feeding of straw, or pine tops, if you please; for it invigorates their health and makes a change in their food. They ought all to be daily watered, and if your hay has not been salted, to have a lick of salt occasionally. The opinion that sheep do not want water is erroneous; repeated observation has convinced me that

it is almost as indispensable to their welfare as their food, and the sooner farmers get rid of this notion the better for both their interests and understanding. I have tried the experiment of keeping sheep without water in conformity with this improper custom so often and thoroughly, that I have come to the conclusion that the only safe rule is the opposite one. I could repeat the several occasions when I have acted upon this plan for my own information, were it necessary, but I only add that the result in my hands was invariable, that is, my sheep grew thin, as it was, that they immediately improved when I adopted an opposite practice. With this care you will save all your sheep; or not lose more of them than you would of the same number of horses and cattle. They will have no disease among them. I have often thought of an observation, made to me by an experienced wool-grower from whom I once asked for information of the diseases of sheep; he answered, "what have you to do with the diseases of sheep? take care of them and you will have no need for remedies." This observation struck me as strange at the time, but subsequent experience has amply confirmed it. And now, what will the farmer gain by keeping his sheep well? In the first place, he will save his hay, a fat sheep will not eat so much as a poor one; he will save all his grain—sheep in good condition do not require any. In the next place, he will save all his sheep—he will have more and better lambs in the spring, besides several ounces more of wool to each sheep; and what is better than all the rest, he will in the end save himself loss and anxiety. The saving will at least be from one-eight to one-fourth of the value of his flock, and all this by attending to a necessary work in due season.

A.

TRIAL OF MR. HERBEMONT'S WINE.

[We regret that the accidents mentioned below should have prevented an examination of all the wine. In addition to this decision, we had before heard expressed, by Gideon B. Smith, Esq. formerly editor of the American Farmer, praise equally strong, and more fully stated, of the fine flavor of Mr. Herbemont's Champagne wine.]

To the Editor of the Farmers' Register.

Nelson Co., Feb. 16th, 1835.

By a series of accidents the several specimens of Mr. Herbemont's wine failed to reach me at the time (and those of one kind in the condition) which I expected, which has prevented my writing heretofore. Having, as I mentioned to you before, but little pretensions myself to connoisseurship in such matters I submitted the first (the Champagne) to the judgement of a friend whose opportunities and observation qualified him to speak understandingly—and my natural taste concurred with his more cultivated, in pronouncing it the best specimen of American wine we had ever seen. It seems to differ from the most acceptable imported of the same kind in nothing, except its being still, instead of sparkling.

Unluckily one of the bottles of "Port" was broken, and the cork of the other was loosened—which so impaired its flavor as to forbid the expression of opinion as to its merits. The third kind having been sent in a different direction, I did not see it until the last month, when several gentlemen partook of it. It was thought at the time to resemble in most of its properties, the "Madeira" generally consumed in this country, except perhaps that it had less body and but little of the saccharine taste. This may arise from its having, as I learn, no addition of spirit, and but little of the second ingredient being necessary for its preservation when it is not subjected to the trial of a voyage.

These three kinds of wine, were all made, as I understand, by a variation of the process, from one species of grape (Herbemont's Madeira) until lately supposed to be a native: and together with other successful specimens, should suffice to remove every doubt as to the adaptation of our climate and soil to this species of culture.

N. F. CABELL.

EXTRACTS FROM PRIVATE CORRESPONDENCE.

FENCE LAW AND TAX—COLD WEATHER.

Nottoway, December 15th, 1834.

The petition to the legislature for a change in the fence law will take well here. There is very little objection, and amongst the intelligent, almost none. The thing was started rather too late for this session, though I should like to see it discussed, as it would thereby set the public mind in operation, which is all that is necessary. If it could be effected in five years, western migration would be checked, because our lands could be made rich, and the cultivation profitable.

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Columbia, S. C., February 10th, 1835.

* * * We have had these four days the coldest weather I have ever felt here. The thermometer was on Sunday (the 8th) two degrees below zero, a degree of cold unknown here before, at least for a great number of years. It is to-day 10 degrees above 0. * * * *

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February 12th, 1835.

The most important subject to farmers now, is the proposed change in our fence law. I hope you will not let that subject sleep, as I am well convinced, more important interests are connected with it, than with any of the absorbing political questions of the day. By way of illustrating the excessive expenses attendant on the present law of enclosures, I would barely state a fact in regard to my own plantation. I have 1500 acres of land, on which I have (of necessity) fourteen miles of fence, (one-third of which is distant from my supply of timber an average of two miles) one mile and a half of which is on a stream very liable to inundation, and is, in fact, carried off at least once in two years. Now the whole fencing I would require, in case of the proposed change of the law, to protect my arable land, or rather to keep in my own stock, would not exceed three miles, and that convenient to timber. Mine is by no means an unusually strong case; there are many within my own knowledge equally oppressive, and yet demagogue-ism is resisting our efforts at relief from this most unjust and distressing tax. The thing is, however, gaining ground, and your paper is a powerful agent in the work.